WHAT COMMUNITY CHARACTERISTICS LEAD TO THE SUCCESSFUL OUTCOME OF RURAL WATER PROJECTS?

By

Josephine-Mary Sam

RECOMMENDED:

Judy Shepherd, Ph.D.

Lewis Shapiro, Ph.D.

Anthony Gasbarro, M.S.

Chanda Meek, Ph.D.

Susan Todd, Ph.D.
Advisory Committee Chair

Peter Fix, Ph.D.
Chair, Department of Natural Resources Management

APPROVED:

David Valentine, Ph.D.
Director of Academic Programs
School of Natural Resources and Extension

John Eichelberger, Ph.D.
Dean of the Graduate School

4/5/2016
Date

WHAT COMMUNITY CHARACTERISTICS LEAD TO THE SUCCESSFUL OUTCOME OF RURAL WATER PROJECTS?

A

DISSERTATION

Presented to the Faculty

of the University of Alaska Fairbanks

in Partial Fulfillment of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

By

Josephine-Mary Sam, B.A., M.S.

Fairbanks, Alaska

May 2016

Abstract

Programs to provide clean water have been shown to lead to improvements in education, health and women's economic conditions in beneficiary communities in the developing world. However, methods to ensure the sustainability of rural water supplies have been elusive. Handpumps in rural communities break down frequently; over 50 percent of handpumps in sub-Saharan Africa are unusable at any time, causing the people to go back to their traditional water sources of streams, ponds and shallow wells with their attendant health risks and inconvenience. These repeated failures have led development practitioners and funding agencies like the European Union to question the effectiveness of rural water supply programs. Clearly, there is a need to determine how to make rural water projects more sustainable. In this study, I posit that sustainable water projects are a function of five categories of variables: demonstrated ability to manage local projects, financial management of local projects, voluntary participation in community projects, an active role of women within the community, and widespread understanding of the benefits of clean water.

This study addresses gaps in research within the rural water supply sector by examining multiple factors that influence the outcomes of rural water supply projects, rather than focusing on single variables as done in previous studies. I used interviews, focus group discussions, and analysis of village records to determine if these variables influenced the status of water projects in eight villages in Ghana. I found that all of these variables play a role in successful community water projects. It takes efficient leadership to formulate and implement effective rules; an engaged, responsible citizenry who appreciate the importance of clean water to ensure compliance; efficient financial management to afford the cost of routine maintenance, and active women's participation in managing the facility. The latter should include training women to conduct routine maintenance and repair simple faults. This ensures that women, who have the highest stake in a convenient source of clean water, have a direct role in its maintenance. The presence of a strong monitoring system and the availability of timely technical support were also crucial in ensuring successful water projects. These findings

demonstrate that while the infrastructure of community water supplies is important, the presence of a strong management system is as vital to their long-term success. This highlights the need to invest in both infrastructure and management of rural water supply projects.

Table of Contents

Page

Signature Page i

Title Page iii

Abstract v

Table of Contents vii

List of Figures xiii

List of Tables xv

List of Appendices xvii

Acknowledgements xix

Dedication xxi

CHAPTER 1: INTRODUCTION 1

1.1 Purpose 4

1.2 Study Variables 6

1.2.1 Response variable: The sustainability of the water facility 9

1.2.2 Explanatory variables 9

1.2.2.1. Demonstrated ability to manage local projects 9

1.2.2.2 Financial management of local projects 11

1.2.2.3 Voluntary participation in community projects 11

1.2.2.4 Active role of women within the community 12

1.2.2.5 Widespread understanding of the benefits of clean water 13

1.3 Description of Study Area (Ajumako-Enyan-Essiam District) 15

1.3.1 Location, physical features and water resources 15

1.3.1.1 Access and transportation 16

1.3.1.2 Utilities 17
1.3.1.3 Housing 17
1.3.2 Population 19
1.3.3 Social organization 19
1.3.3.1 Governance 19
1.3.3.2 Education 20
1.3.3.3 Religion 20
1.3.4 Economic activities 21
1.3.4.1 General economy of the Ajumako Enyan Essiam District 21
1.3.4.2 Economics of the study communities 21
1.3.5 Types of pumps used in study communities 22
CHAPTER 2: LITERATURE REVIEW 25
2.1 Sustainability of the Water Facility 25
2.2 Demonstrated Ability to Manage Local Projects 27
2.3 Voluntary Participation in Community Projects 33
2.4 Active Role of Women Within the Community 35
2.5 Widespread Understanding of the Benefits of Clean Water 38
CHAPTER 3: METHODS 41
3.1 Sample Population 41
3.1.1 Community consultation and involvement 42
3.1.2 Water management committees 42
3.1.3 Gender sensitive programming 43
3.1.4 Financing for sustainability 43
3.1.5 Health and sanitation education 43
3.1.6 Training of local pump technicians 44

3.2 Data Gathering 45
3.2.1 Interviews and focus groups 45
3.2.2 Participatory action research 46
3.2.2.1 Local women as researchers 47
3.2.3 Robustness analysis 49
3.2.4 Scoring criteria for each variable 50
3.4 Data Analysis 55
CHAPTER 4: RESULTS 57
4.1. Response Variable: Sustainability of the Water Facility 57
4.1.1. Was it working at the time of study? 57
4.1.2. Has the handpump ever malfunctioned? 58
4.1.3. How often has the handpump malfunctioned, and was it promptly repaired? 58
4.2. Explanatory Variables 62
4.2.1. Demonstrated ability to manage local projects 62
4.2.1.1. Clearly defined, equitable and well-enforced rules governing local projects 64
4.2.1.2. Effective conflict resolution mechanisms 67
4.2.1.3. Monitoring 67
4.2.1.4. Provisions for technical support (know who to contact for repairs) 69
4.2.1.5. Diligence on pump maintenance 69
4.2.1.6. Cleanliness of the pump area 70
4.2.1.7. Role of leadership in managing the water facility 70
4.2.1.8. Predictability of rules and regulations governing local projects 71
4.2.1.9. Responsiveness in enforcing rules and regulations governing local projects 71
4.2.2. Financial management of local projects 75
4.2.2.1. Water fee policy (Is a fee schedule set?) 75

4.2.2.2. Are fees actually collected? 76
4.2.2.3. Verification of savings account and money available when needed 77
4.2.3. Voluntary participation in community projects 80
4.2.3.1. Participatory decision-making 81
4.2.3.2. Meeting times that are convenient and have strong participation by community 81
4.2.3.3. Sense of ownership toward local projects 82
4.2.3.4. Sense of responsibility toward local projects 83
4.2.3.5. Social cohesion 84
4.2.4. Active role of women within the community 88
4.2.4.1. Status of women in community 89
4.2.4.2. Level of women's participation in community efforts 92
4.2.4.3. Impact of pump training 94
4.2.5. Widespread understanding of the benefits of clean water 100
4.2.5.1. To what extent is the facility being used? 101
4.2.5.2. Attitudes toward location of water facility 102
4.2.5.3. Knowledge of health importance of using clean water 103
4.2.5.4. Level of support for charging for water 104
4.2.5.5. Perceptions of reliability of water facility 105
4.3. Comparison Across Villages 107
CHAPTER 5: CONCLUSION 109
5.1 Aims of the Research 109
5.2 Key Findings 109
5.3 The Significance of the Research 112
5.4 Implications of Findings 113
5.5 Recommendations for Future Research 115

LITERATURE CITED 117

APPENDICES 125

List of Figures

Page

Figure 1.1 Relationship between indicators and a successful water project 6

Figure 1.2. Map of Ghana showing location of study area 15

Figure 1.3. Typical homes in study communities 17

Figure 1.4. A single-family home in the study area. 18

Figure 1.5. A fenced extended family home in the study area. 19

Figure 1.6. Types of pumps in study communities 23

Figure C1. The veranda of the nursery school 165

Figure C2. Budukwaa handpump 173

Figure C3. The two handpumps in Etsii Abeka 179

Figure C4. The overgrown path leading to one of the community handpumps 183

List of Tables

Page

Table 1.1. List of variables used in the study 7

Table 2.1. Design principles illustrated by long-enduring CPR institutions 28

Table 3.1. Scoring criteria for each variable 51

Table 4.1. Year of installation for each handpump 58

Table 4.2. How long did it take to get repairs? 61

Table 4.3. Scores for sustainability of water facilities 62

Table 4.4. Rules governing the water projects in study communities 64

Table 4.5. Types of projects in study communities, indicating rules, enforcement mechanisms and penalties for noncompliance 66

Table 4.6. Scores for demonstrated ability to manage local projects 72

Table 4.7. Key findings on demonstrated ability to manage local projects 73

Table 4.8. Types of financial policies adopted in study communities 76

Table 4.9. Scores for variables on financial management of local projects 78

Table 4.10. Key findings on financial management of local projects 79

Table 4.11. Methods for determining social cohesion ("unity and oneness") based on findings .. 85

Table 4.12. Scores for voluntary participation in community projects 86

Table 4.13. Key findings on voluntary participation in community projects 87

Table 4.14. Number of women on each committee in each village 91

Table 4.15. Scores for the role of women in study communities 98

Table 4.16. Key findings on the role of women in study communities 100

Table 4.17. Rationale for attitudes toward location of water facilities in study communities 103

Table 4.18. Scores for widespread understanding of the benefits of a water facility 106

Table 4.19. Key findings on widespread understanding of the benefits of a water facility..... 106

Table 4.20. Summary of scores for each variable..... 107

Table 5.1. Comparison of two types of women's participation in community development .....

projects..... 111

Table C-1. Summary of findings in Afranse..... 133

Table C-2. Summary of findings in Atwereboanda..... 145

Table C-3. Summary of findings in Awordo..... 156

Table C-4. Summary of findings in Badukrom..... 163

Table C-5. Summary of findings in Budukwaa..... 177

Table C-6. Summary of findings in Etsii Abeka..... 190

Table C-7. Summary of findings in Eyiakrom..... 205

Table C-8. Summary of findings in Ogoekrom..... 212

List of Appendices

Page

Appendix A: Comparison of Village Performance and Scores 125

Appendix B: Interview Guide 127

Appendix C: Village Notes 128

C-1 Afranse 128

C-2 Atwereboanda 134

C-3 Awordo 145

C-4 Badukrom 156

C-5 Budukwaa 163

C-6 Etsii Abeka 178

C-7 Eyiakrom 191

C-8 Ogoekrom 206

Appendix D: Institutional Review Board Research Approval Letter 213

Acknowledgements

I give utmost thanks to God Almighty, the fountain of my strength and intellect.

This dissertation was made possible due to the immense support I received at every stage. In particular, I wish to acknowledge the central roles played by the following:

My mentor and committee chair, Dr. Susan Todd, whose visionary guidance and zeal inspired me every step of the way.

My graduate committee members—Dr. Judy Shepherd, Mr. Anthony Gasbarro, Dr. Lewis Shapiro, and Dr. Chanda Meek, for their dedication and vital insights that helped shape this dissertation.

The Resilience and Adaptation Program (RAP) at UAF and the UAF Graduate School, for the funding that helped smoothen the path considerably.

My family—particularly my siblings Elizabeth Asare and Joseph Amankwaa Sam—for their immense support, both moral and material.

My good friend Thomas Buabeng, for his invaluable help with logistics during my fieldwork.

The Nyarkoa Foundation, Rural Education and Development Program (REDEP)—in particular, Mr. James Addo (REDEP Executive Director) and Mr. Robert Cudjoe (REDEP Coordinator), and the residents of my study communities, for their cooperation that made this study a truly rewarding experience.

And to all the special people who contributed to this work in one way or the other, I say a big Thank You!

Dedication

To my dear friends Lewis and Judith Shapiro, who made it possible to follow my dreams.

To my parents, Stephen Benjamin and Mary Magdalene Sam, who inspired me to dream.

CHAPTER 1: INTRODUCTION

> The water sector is dominated by a handful of images—poor people collecting water from unprotected sources, or the converse of a happy child lapping fresh water from a newly provided water source. While compelling, this imagery is not entirely accurate…. A better picture might be one of a woman walking past a broken water point, on her way back to the polluted water source she had hoped was abandoned forever. (Breslin, 2010, p. 65)

Global reports on the status of clean water supply provide grim statistics, signaling a call for action. For example, the 2015 United Nations International Children's Emergency Fund (UNICEF) and Word Health Organization (WHO) report on sanitation and drinking water indicates that "663 million people still lack improved drinking water sources" (United Nations International Children's Emergency Fund & World Health Organization, 2015, p. 4). Studies have shown that an estimated four out of 10 people in sub-Saharan Africa lack access to safe drinking water. Worldwide, the rural population without access to clean water is "five times greater than in urban areas," (United Nations International Children's Emergency Fund, & World Health Organization, 2012, p. 66), with eight out of 10 rural dwellers lacking access to clean water (United Nations International Children's Emergency Fund, & World Health Organization, 2015, p. 4).

Challenges in meeting the global demand for clean water supply are compounded by high failure rates of rural water supply projects, as depicted in the quote at the beginning of this chapter. There is documentary evidence that at any time, an estimated 30 to 40 percent of handpumps in Africa are not functional, with failure rates ranging from 30 to 60 percent in individual countries (Baumann, 2009; Harvey & Reed, 2007; Sutton & Kayaga, 2005). In June 2013, a British parliamentary inquiry into the status of water projects in sub-Saharan Africa funded by the European Union concluded that "Fewer than half of a sample of 23 projects met poor people's needs" due to a lack of sustainability (Doyle, 2013).

These examples underscore the widespread problem of the ineffectiveness of water projects as a result of failures to ensure long-term success (see, for example, Montgomery, Bartram, & Elimelech, 2009; Huby & Stevenson, 2003; Carter, Tyrrel, & Howsam, 1999).

Ranking sixth on the United Nations Sustainable Development Goals adopted in September 2015 is ensuring the "availability and sustainable management of water and sanitation for all" (United Nations, 2015, p. 14). The continued challenges to fostering long-term water supply for rural communities in the developing world indicate that it is crucial to identify the factors that make success in this area elusive. Ultimately, the community regulatory processes surrounding the use of water facilities need as much attention as technical and infrastructural provisions (Jimenez & Perez-Foguet, 2010).

According to the United Nations Economic and Social Council (2009), the lack of safe drinking water and poor sanitation practices are the leading causes of poor health in many developing countries. It also reports that 470,000 deaths could be prevented annually by providing access to safe water for half the population currently without such access. Research in developing countries has shown that the provision of safe drinking water and sanitation contributes to significant reduction in the incidence of child mortality and diseases such as ascariasis, diarrhea, schistosomiasis and trachoma among the population. Along with guinea worm and cholera, these conditions are highly prevalent in West Africa and other places that lack access to safe water and sanitation. Dracunculiasis, hookworm infection, schistosomiasis and trachoma tend to be more locally restricted, yet common in the developing world. Dracunculiasis, however, occurs only in parts of Africa and Asia, and is particularly prevalent in poor, isolated rural areas that have a high dependency on stagnant water and ponds. It is reported to be the leading cause of ill health in places that use water from unsafe sources like streams, usually leaving those afflicted too weak to work or attend school. This illustrates the correlation between lack of access to safe water, poverty and school absenteeism (ECOSOC, 2009; Harvey, 2008; Tay, 2005, p. 2; VOA, July 2009; Hunter, 1997a, p. 105; Esrey, Potash, Roberts, & Shiff, 1991, p. 609).

The lack of access to clean water also exerts financial costs. For example, the United Nations Human Development Report (2006) estimated that the lack of safe water and sanitation costs sub-Saharan Africa about 5 percent of its Gross Domestic Product (GDP) each year; that translates into a loss of $28.4 billion each year (UNDP, 2006, p. 6).

This study arose out of the findings from my previous evaluation of an ongoing rural water program in the Ajumako-Enyan-Essiam District of Ghana (Sam, 2011). Two nonprofit organizations, the Nyarkoa Foundation (NF) based in the United States, and the Rural Education and Development Program (REDEP) of Ghana, are implementing the program. REDEP's officers and volunteers are present or former residents of the District and know the social and cultural characteristics of the villages covered this study. The NF/REDEP program involves replacing and repairing broken, manual water pumps (handpumps), and is in its eighth year of operation.

I examined the impacts of the NF/REDEP water program in two beneficiary communities, where faulty handpumps had been replaced. Both benefited in terms of improved school punctuality, reduced time and distance for water collection, and enhanced women's income-generating opportunities. However, one lacked efficient project management, which reduced the effectiveness of the project as unpaid water levies led to a lack of funds for the maintenance of the pump. Also, failures of the pump were not reported because there was no one with authority to do so. The other had established rules that included locking the pump at night and charging monthly levies, which was being paid by a majority of residents.

Women were not actively involved in the management of the project in either village, even though they were represented on the respective Water and Sanitation (WATSAN) Committees. Of particular concern was the observation that in spite of the obvious benefits and the fact that they were the primary users of the water pump, the women in the first village appeared indifferent to rules like payment of a water levy to maintain the pump. The ramifications of this attitude were already felt in 2010 (two years after the pump replacement), when the pump was not functional for three weeks (Sam, 2011) and

again when it broke down in 2012. This leads to the question of the future consequences of continued exclusion of women in program management in similar circumstances.

Previous studies have examined how single variables including community participation and a sense of ownership impact the performance of rural water projects (Montgomery et al., 2009; Gleitsmann, Kroma, & Steenhuis, 2007; Carter et al., 1999; Bamberger, 1988). Others evaluated impacts of clean water on health, education, and women's empowerment (Sam, 2011; Harvey, 2008; Buor, 2004; Esrey et al., 1991). And several offered recommendations on improving water projects through women's participation (Gender and Water Alliance, 2006a, 2006b; Ivens, 2008; Sam, 2011). However, the literature does not provide insights into how all of these variables influence sustainability. For example, the studies that mentioned instances of women's participation provided no follow-up on how it impacts project performance in the long-term.

Examining variables in isolation hinders the in-depth diagnosis of problems faced by the rural water sector. This study was therefore developed to take a more holistic approach to identifying the specific variables that enhance successful rural water projects over the long term. Findings will be useful for communities and development practitioners in two ways: 1) they will help nongovernmental organizations to identify the villages most likely to be successful in managing a water project, and 2) they indicate where the shortcomings are which can help villages improve their capacity to manage a water project.

1.1 Purpose

The purpose of this study is to identify community characteristics that lead to the successful outcome of rural water projects. The study was developed in response to the global need for sustainable rural water supplies.

Research has shown that the lack of access to clean water affects the health, education and finances of rural communities. Low-income communities such as the rural Ghanaian farming villages in this study have long depended on external help to meet their socio-economic needs. Development

interventions like the provision of clean water have been proven to lead to improvements in education, health and women's economic conditions in beneficiary communities (Sam, 2011; Harvey, 2008; Ivens, 2008; Gender and Water Alliance, 2006a; Ajayi & Otuya, 2006; Buor, 2004; Huby & Stevenson, 2003).

In spite of these known benefits, sustainable maintenance of rural water supplies has been elusive. As Tropp (2007) observes, technologies that enable improved water supply are not immune to failure. Water pumps break down frequently, and communities that had their water needs met at one time end up reverting to distant streams, ponds and shallow wells with their attendant health risks and inconvenience.

The objective of this study is to assess the extent to which the following five categories of variables influence the success (or sustainability) of community water facilities:

1. Demonstrated ability to manage local projects.
2. Financial management of local projects.
3. Voluntary participation in community projects.
4. Active role of women within the community.
5. Widespread understanding of the benefits of clean water.

While the study is aimed at water projects, the results will have application in rural development projects in general. The aim is to examine the performance of existing projects based on the above-listed criteria. The resulting model could be used as a guideline in selecting sites for other development projects.

According to the *Concise Oxford English Dictionary*, to sustain something is to "keep [it] going over time or continuously" (Soanes & Stevenson, 2008, p. 1452). I define a "successful community water project" as one that ensures a continuous supply of clean water over the long term, and I use the terms 'successful' and 'sustainable' interchangeably in reference to this concept. As illustrated in Figure 1.1, I postulate that sustainable water projects are a function of five categories of variables: demonstrated ability to manage local projects, financial management of local projects, voluntary participation in community projects, active role of women within the community, and widespread understanding of the benefits of clean water. In other words, these are preconditions for a successful water project.

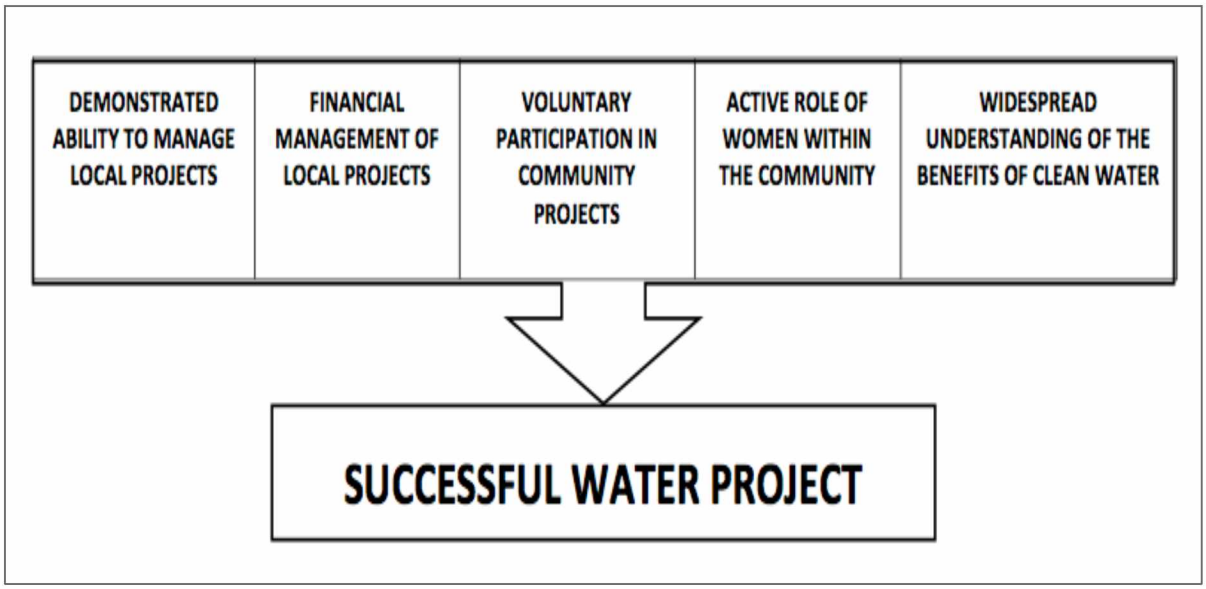

Figure 1.1 Relationship between indicators and a successful water project

1.2 Study Variables

This study offers a method for predicting the sustainability of rural water facilities based on five categories of variables, which are listed in Table 1.1 along with their sources in the literature. These variables are a combination of the characteristics recommended by the literature on rural water supplies, community development, common property resource management (CPR), and women's empowerment, as well as the components of the NF/REDEP water program being implemented in study communities.

Table 1.1. List of variables used in the study

CATEGORY	VARIABLE	SOURCES
RESPONSE VARIABLES		
Sustainability of the Water Facility	Was it working at the time of study?	Based on knowledge of the factors affecting sustainability as observed from the NF/REDEP water program and discussed in the literature (E.g. Schouten & Moriarty, 2003; Abrams et al., 2003; Harvey & Reed, 2003).
	Has the handpump ever malfunctioned?	
	How long did it take to get repairs?	
EXPLANATORY VARIABLES		
A. Demonstrated ability to manage local projects	1. Clearly defined, equitable and well-enforced rules governing local projects	Ostrom, 1990, 2009; Anderies, Janssen, & Ostrom, 2004Garande & Dagg, 2005; Iza & Stein, 2009; Meinzen-Dick, DiGregorio, & McCarthy, 2004; Montgomery et al., 2009 NF//REDEP Program Rogers & Hall, 2003 Tortajada, 2010 Sam, 2011
	2. Effective conflict resolution mechanisms	
	3. Monitoring	
	4. Provisions for technical support (know who to contact, etc)	
	5. Diligence on pump maintenance (tighten bolts, watch for signs of wear, etc)	
	6. Cleanliness of the pump area.	
	7. Role of leadership in local projects	
	8. Predictability of rules and regulations governing local projects	
	9. Responsiveness in enforcing rules and regulations governing local projects	
B. Financial management of local projects	10. Fee schedule is set	Montgomery et al., 2009 Rogers & Hall, 2003 NF//REDEP Program
	11. Fees are actually collected	
	12. Verification of savings account and money available when needed	
	13. Accountability & Transparency	

Table 1.1. List of variables (continued)

CATEGORY	VARIABLE	SOURCES
EXPLANATORY VARIABLES		
C. Voluntary participation in community projects	14. Participatory decision-making	Fraser et al., 2006 Thomas, 2002; Lucas, 2001; Wetmore & Theron, 1998) Carter, 2009; Engel, et al., 2005; Gleitsmann et al, 2007; Gruber, 2010; Prokopy, 2005)
	15. Meeting times that are convenient and have strong participation by community	
	16. Sense of ownership toward local projects	
	17. Sense of responsibility toward local projects	
	18. Social cohesion	
	19. Past approach to community water issues.	
D. Active role of women within the community	20. Status of women in community, women's influence in the community, women's active participation in decision-making	Msukwa & Taylor, 2011 Sam, 2011 Braimoh, 2004 Regmi & Fawcett, 1999 Athukorala, 1996
	21a. Level of women's participation in community efforts; 21b.women's involvement, contribution and acceptance of organizational responsibility	
	22.Impact of technical training for pump maintenance	
E. Widespread understanding of the benefits of clean water	23. To what extent is the facility being used?	Checkley et al., 2004 Plate et al., 2004 Hunter, 1997a Esrey et al., 1991 Carter, 2009 Carter et al., 1999 Huby & Stevenson, 2003
	24. Knowledge of health importance of using clean water	
	25. Attitude toward location of water facility	
	26. Perceived cost of buying water	
	27. Perceptions of reliability of water facility	

1.2.1 Response variable: The sustainability of the water facility

The sustainability of the water facility is the response variable because it is the ultimate outcome for rural water supply projects, and believed to be directly influenced by the variables listed in section 1.1. A sustainable water facility is one that is capable of supplying the water needs of a community without interruption over the long term (Schouten & Moriarty, 2003; Abrams, Palmer & Hart, 2003; Harvey & Reed, 2003). The international water community has been on a quest for more sustainable facilities since it became clear that the issue of rural water supply is not solved simply by implementing water projects (Carter, 2009; Montgomery et al., 2009).

Carter et al. (1999, p. 1) recommend that programs aimed at addressing community water supply and sanitation problems in the developing world should be based on a full comprehension of the prevailing situation, the potential benefits of the proposed intervention, and the factors that influence sustainability. They further point out that development projects can only be truly beneficial if their impacts are sustainable in the long run, and that long-term sustainability is often impeded by a variety of factors, such as prevailing attitudes in beneficiary communities, institutional constraints and limited finances. In analyzing the impact and sustainability of clean water and sanitation projects in the developing world, they observe that no single approach has the capacity to solve the recurring problem of failed projects. Rather, they advocate synthesizing different approaches such as community participation, financing for maintenance and emphasizing the importance of sustaining benefits of improved water supply.

1.2.2 Explanatory variables

1.2.2.1. Demonstrated ability to manage local projects

This category includes the variables regarding governance of local projects. Since water facilities are community-owned, lessons and recommendations from the governance of large-scale water systems and common property resources (CPR) should be applicable to this situation. Eleanor Ostrom developed principles that influence the success of CPR management. Among other traits, Ostrom's work—and subsequent studies—have shown that conditions that enhance the long-term success of CPR include (1)

social cohesion; (2) clearly defined, equitable and well-enforced rules; (3) effective mechanisms for conflict resolution, and (4) monitoring (Anderies et al., 2004; Garande & Dagg, 2005; Iza & Stein, 2009; Meinzen-Dick, DiGregorio, & McCarthy, 2004; Ostrom, 2009). The active involvement of women in the management of community water projects is also encouraged, given their primary responsibility for household water supply (Doe & Khan, 2004; Gender and Water Alliance, 2006a, 2006b; Wakeman, Davis, Wijk, Naithani, & Mundial, 1996; Rogers & Hall, 2003).

Rogers (2006, p. 16) describes governance as the "manner in which *allocative and regulatory* politics are exercised in the management of resources (natural, economic, and social) and broadly embraces the formal and informal institutions." Rogers and Hall (2003, p. 7) define water governance as "the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society." Lautze, De Silva, Giordano, and Sanford (2011, p. 7) clarify that "Water Governance consists of the processes and institutions by which decisions that affect water are made." In the context of this study, I define governance as methods used in managing community water facilities. It includes my variables on rules and procedures covering the use of the water pumps such as pump closure times and restrictions, financial arrangements, maintenance and mechanisms for conflict resolution (Ostrom, 1990, 2009; Anderies et al., 2004).

The physical properties of common-pool resources—including water—have a significant influence on their governance. For example, in order to enforce use regulations, the resource in question must have clearly defined parameters. The ability (or inability) to exclude users has influence on the willingness of the community to regulate and comply with rules. In other words, users are more likely to cooperate if refusal to do so would result in denial of the resource. In addition, users' perception about the yield of the resource affects the manner in which it is utilized and governed. Thus, perceptions of scarcity may prompt more responsible and conservative management, while perceptions of abundance may lead to

overuse and apathy about performance of the system (Agrawal & Benson, 2011; Ostrom, 2009; Agrawal, 2001, 2003; Esrey et al., 1991;).

Campbell et al., (2001, pp. 595, 596) observe that the actual realities of common property resource management differ from the optimism expressed in the CPR literature. They recognize the need to adopt broader, "more interdisciplinary perspectives" so as to gain greater insight into the social and cultural factors that influence the governance of common property resources.

The CPR governance concept represents tested principles for successful natural resources management. Applying the CPR governance principles to rural water supply projects—such as examining communities' demonstrated ability to manage local projects—is significant because it highlights the responsibilities that communities have toward their water facilities, as opposed to viewing them as passive recipients of development assistance. This study therefore provides an opportunity to examine how the principles recommended in the CPR literature operate within the context of rural water projects.

1.2.2.2 Financial management of local projects

Considering that the lack of funds for maintenance is one of the primary reasons for project failures, communities need to be financially committed to their water projects. Montgomery et al, (2009, p. 1021) observe that ensuring long-term success of water projects requires setting up "a financial plan." Breslin (2010) notes that it is important for communities to learn beforehand their financial responsibilities toward the operation and maintenance of a water facility. Therefore, this study looked for evidence of financial commitment by analyzing the nature of financial arrangements. Variables in this category included whether communities have stipulated water fees, whether fees are actually collected, and the amount of money saved (as reflected in a bank deposit book).

1.2.2.3 Voluntary participation in community projects

Rogers and Hall (2003, p. 9) identify "inclusiveness, accountability, participation, transparency, predictability and responsiveness" as preconditions for good governance. Tortajada (2010, p. 306) notes

that such prerequisites for good governance as "responsibility, accountability, transparency, equity and fairness" are ethical considerations that could potentially complicate water policy implementation. Given their importance, these traits were incorporated into the study variables, and I looked for evidence of their existence in study communities.

It is interesting to note that although community involvement was recommended mainly as a way to garner local support in the early stages of development work (Bamberger, 1988), experience has shown it is also critical to the long-term success of development interventions (Fraser et al., 2006; Thomas, 2002; Lucas, 2001; Wetmore & Theron, 1998). This study therefore measured the extent of community involvement in local projects.

1.2.2.4 Active role of women within the community

Across the developing world, women have primary responsibility for household water supply. For instance, women in sub-Saharan Africa spend, on average, about four hours daily on water errands (Sam, 2011, Gender and Water Alliance, 2006a; Momsen, 2004, p. 71). Women in these societies—particularly those living in rural areas—have little or no decision making authority (Robson & Spence, 2011; Jingzhong, 2008; Jeris et al., 2006; Opare, 2005; Braimoh et al., 2004; Lucas, 2001; Kabeer, 1991). This effectively leaves women excluded from active participation in managing the water facilities that consume so much of their time.

Research on women's empowerment recognizes that projects that acknowledge the existence of gender inequalities and incorporate measures aimed at addressing them during project design and implementation have a greater chance of improving women's lives. It is also recognized that projects that consciously address gender inequalities can improve the management of water resources and enhance the lives of men, women and children (Gender and Water Alliance 2006a, pp. 4, 18).

Because of the traditional exclusion of women from decision-making, efforts to encourage their participation in community projects must be genuine and effective to achieve the goals of sustainability. In their evaluation of women's self-help groups in Nigeria, Ajayi & Otuya (2006) note that people

participate in community development projects primarily because they are convinced it would be beneficial to them. However, as Lucas (2001, p. 192) points out, "women become real participants and beneficiaries through their involvement, contribution and acceptance of organizational responsibility." This implies that appointing women as nominal committee members or coercing them to 'participate' in community programs does not guarantee their active involvement. For example, in analyzing the gender dynamics in the operations of Community Forest Groups in India and Nepal, Agarwal (2002, p. 3) identified a pattern that she describes as "non-voluntary cooperation" where some individuals, mostly women, are coerced into complying with regulations. This is especially relevant to the water program under study, where the appointment of women to Water and Sanitation (WATSAN) committees, initially perceived as a means of facilitating a stronger decision-making role for them, has failed to ensure women's active participation in managing the projects due to entrenched patriarchy. They may sit on the committee because an NGO requires them to be there, but the men do not allow the women to take a role in the committee's decisions.

Any evaluation of the performance of community water facilities must therefore examine the level of influence held by local women in study communities, and what role, if any, women play in managing those facilities.

1.2.2.5 Widespread understanding of the benefits of clean water

For a project to be successful, it is also important that the local people *want* it. Therefore, one of the study variables involves examining the actual views of project beneficiaries about the interventions. Carter (2009, p. 3) notes that "a strong user-perception of need, and consequent high motivation to maintain an improved water supply" is essential for success in community water projects. Understanding the actual perceptions of villagers about the water projects would show whether or not they consider the projects to be necessary in the first place. It is highly unlikely that people will be committed to sustaining something they have little or no use for.

Huby and Stevenson (2003, p. 200) observe that the sustainability of rural water programs is influenced by local residents' attitude toward their situation, their ability to implement the necessary improvements, and their readiness to actually effect the desired change. They also caution against mistaking verbal declarations by residents to participate in the desired change as real commitment. Thus, the effective way to determine true intentions is to examine evidence in project communities.

Despite the well-documented health benefits of using safe drinking water (see, for example, Checkley et al., 2004; Plate et al., 2004; Hunter, 1997a; Esrey et al., 1991), some community members continue to use unsafe water sources even when clean water is readily available (Sam, 2011). This reveals a lack of appreciation of the health benefits of clean water, and hence a reluctance to invest in the long-term success of improved water facilities. This is often reflected in community priorities, as I discovered first hand in a village in the Volta Region of Ghana. The village has a long-running ecotourism business, which has enabled it to provide high school scholarships for some students, build a school and clinic and distribute profits to village groups and owners. During a visit in 2010, I noted that only one of the four hand pumps in the village was operating and it was in the process of breaking down. When asked how the community would deal with the loss of the last pump, the answer was that most of the people were already taking water from a nearby river. Despite probably having the funds, there was no interest in the community in repairing the pumps, and the health benefits of having clean water for household use were simply not recognized. This knowledge prompted me to look beyond study communities' declarations about the importance of clean water, but to also examine whether the declarations were reflected in usage patterns and compliance with rules.

The location of the water resource also influences its relevance to residents. Studies in developing countries have shown that the proximity of rural water facilities affects usage; people are more likely to use an improved water source when it is conveniently located. Furthermore, people are best motivated to manage their water facilities when the alternative supply is erratic and farther away from their community (Carter, 2009; Carter et al., 1999; Esrey et al., 1991).

This study therefore examines whether community members perceive the water projects as important, and how this influences how the projects are governed. As the anecdote illustrates, attitudes also impact project performance, as does leadership.

1.3 Description of Study Area (Ajumako-Enyan-Essiam District)

1.3.1 Location, physical features and water resources

The study communities are located in the Ajumako-Enyan-Essiam District, which is one of the twelve districts in the Central Region of Ghana. The entire District is rural and covers an estimated land area of about 520 square kilometers (200 square miles), representing five percent of the Central Region land area. Figure 1.2 is the map of Ghana (Central Intelligence Agency, 1996) indicating the location of the district.

Figure 1.2. Map of Ghana showing location of study area, Ajumako-Enyan-Essiam District

The Ajumako-Enyan-Essiam District is centered about 40 km inland from the coast of the Gulf of Guinea. The area generally has low relief with elevations from about 35 to 100 meters. The forest cover is semi deciduous. However, much of the original forest had been cleared for the small farms that support the rural population and some larger palm oil and cocoa operations.

Annual rainfall in the District is about 1500 – 2000 mm a year. Like the rest of the country, the area experiences two rainy seasons; most of the rain comes in May and June, and somewhat less falls in September and October. The driest times are December to February. Between late-November and early March, the harmattan winds that blow south from the Sahara desert produce hot, dry, dusty days, and cool nights. During this period, shallow wells and small surface water sources typically dry up, and only large streams retain water. The only surface water during the dry season is a perennial river (locally called "Ochi") that flows through the district.

The bedrock in the District is metamorphosed sedimentary rock intruded by granite. These are normally not good sources of water because, except for fracture zones, they have low porosity. However, the combination of climate and rainfall produces a deeply weathered zone, which is the probable source for many of the wells in the District. Shallow, hand dug wells up to 10 meters deep are common and borehole wells fitted with hand pumps extend somewhat deeper (Dapaah-Siakwan & Gyau-Boakye, 2000, pp. 405-416; Ajumako-Enyan-Essiam District Assembly, 2006).

1.3.1.1 Access and transportation

Access to all the villages except Badukrom is by gravel roads that are poorly maintained and can be impassable during the rainy seasons. There is no public transportation to and from any of the villages except Badukrom, which is on a main road, and there are no privately owned automobiles in any of the villages. If vehicle transportation is necessary, then the only option is to use a cell phone to call for a taxi and that is expensive. Travel between villages is almost always by walking. Bicycles are rare. For longer travel, for example to market centers, one would have to walk to the main road and wait for a passing taxi or minibus.

1.3.1.2 Utilities

All the villages have electric power, but outages are common. There are a few television sets in each village. They are easy to find, because they are usually marked by antennas on bamboo poles that are lashed together to reach up to about 10 meters high. FM radios and cell phones are fairly common, but not universal.

There is no information about other appliances, as questions about property ownership are sensitive to ask. Cooking is mostly done over wood fires and coal pots (fueled with charcoal), and it is possible that some families also use gas stoves as these have gained popularity in recent years.

1.3.1.3 Housing

Houses in study communities are constructed with either mud or cement block and roofed with corrugated iron sheets. Bamboo and rattan are typically used as props and fencing. Figure 1.3 shows examples of houses in the villages.

Figure 1.3. Typical homes in study communities (mud, left) and (cement, right).

House sizes differ and are largely dependent on living arrangements. For example, nuclear family households (as in Figure 1.4) usually consist of three structures; the first is the main living quarter and contains anywhere from one to three rooms, depending on family size and available resources. The second structure is the kitchen, normally located about three meters from the living quarters. This arrangement might be a check against accidental fire outbreak due to the open fire mode of cooking (with

firewood). The third structure is the bathhouse. It is usually a roofless structure, and like the kitchen, could be built of either mud or concrete. Individual households do not have latrines. Rather, residents use designated community latrines that are strategically placed in order to prevent pollution of water sources.

Figure 1.4. A single-family home in the study area. The living quarters is on the left, with the kitchen adjacent and a barn to the side

Extended family households (shown in Figure 1.5) usually consist of grandparents and/or other relatives and are sometimes made up of as many as three nuclear families. Such households live in what are locally called "compound houses," which could either be a cluster of structures or single building with demarcations for each family. Nuclear families could either share one kitchen or build separate ones for themselves. The same applies to bathhouses.

Figure 1.5. A fenced extended family home in the study area, showing two adjoining rooms and the kitchen in the background.

1.3.2 Population

Typical village populations in the district range between about one hundred (100) and nine hundred (900) people. The population of study villages ranged from 122 to 565, according to data from the latest census conducted in 2010.

Most of the adults in all the villages are women and older men. Younger men and men with families to support usually often leave to seek work elsewhere. The point is discussed in section 1.3.4.2 below.

1.3.3 Social organization

Environments and lifestyles are similar, but organization, structure and attitudes about water and community projects vary. Understanding these and finding ways to improve maintenance and performance of village hand pumps are important parts of this study.

1.3.3.1 Governance

Like all rural communities in Ghana, the study communities are headed by hereditary Traditional Chiefs, who are assisted by Queen Mothers and Council of Elders. It should be noted that traditional

rulers in Ghana are in many respects nominal heads. The national government has ultimate jurisdiction in all parts of the country, and chiefs are expected to govern their communities within the framework of the National Constitution.

1.3.3.2 Education

Education level is similar in the all of villages. Most of the women interviewed in this study and in Sam (2011) had little formal schooling and signed the required release forms with a thumbprint. Some of the men did the same, but most had some schooling. Five of the study villages (Afranse, Awordo, Atwereboanda, Eyiakrom and Etsii Abeka) have local elementary and junior high schools. These schools tend to serve five to eight communities, and so children without village schools walk up to 2 km to attend school. Two villages (Badukrom and Budukwaa) have preschools, although the one in Badukrom was not formally open at the time of fieldwork. Children are seldom seen out of school on school days; most villages have a policy where the chief and elders query parents of truant children.

There are no senior high schools in any of the study villages. Senior high schools in Ghana are mostly boarding, and it is the same in the District. Junior high school graduates in the villages have the option to attend senior high schools in any part of the country. A centralized computerized system handles the placement of students based on their performance in the nationwide Basic Education Certificate Examination (BECE), preference, and space availability, in that order.

Students have the option of being 'day students' (commuting from home) if they are admitted to any of the two senior high schools in the District. However, parents from remote villages usually opt for boarding, unless the child is able to stay with a relative who lives in the vicinity of the school.

1.3.3.3 Religion

Religion is an important part of social identity, and, like many communities in Ghana, these villages feature a mix of Christian, Muslim and African Traditional believers.

1.3.4 Economic activities

1.3.4.1 General economy of the Ajumako Enyan Essiam District

The District's economy is based on agriculture, mainly through subsistence farming. The most commonly grown crops are cassava, corn, plantain, yam, oranges and vegetables (eggplant, tomatoes and peppers). Small-scale food processing units are also available for refining palm nuts into palm oil, cassava into *gari* (a floury substance) and grinding corn meal

Food vending is another important source of livelihood for people in the district. Good farm yields typically enable people to sell their surplus produce. Depending on financial circumstances and community location, food vending could involve either setting up market stalls and/or hawking produce or cooked meals prepared from *gari* or corn meal.

The economic lives of residents in study communities follow the general district pattern. With few exceptions, most residents are either completely reliant on subsistence agriculture, or augment their income with other activities such as dressmaking, hairdressing, stone quarrying, small-scale trading and food vending. Others also work as farm laborers for hire.

1.3.4.2 Economics of the study communities

There are no opportunities for steady employment in any of the studied villages, other than for teachers who are posted to the local schools and paid by the national government. None of the teachers are originally from the study communities—though some hail from other parts of the District—and they can ask to be transferred at any time.

As in the rest of the District, the people are subsistence farmers with small plots of land that cannot support large families. Thus, when children are old enough, they usually leave to find work, and the parents continue to operate the farm. As noted, most of the crops are used for subsistence, and any surplus is sold. There are chickens, goats and some sheep loose in the villages that are taken for food by the owners as needed, but there are no provisions for raising larger numbers of animals for sale.

As in other parts of Ghana, land is owned by the royal families of the various clans and is usually under the control of local chiefs. As such, individual farmers do not own the land and so have nothing of value to use as collateral for loans to expand or improve their farming methods. In some areas in the country where the land is valuable for development, it is common for chiefs to sell the land out from under the farmers leaving them essentially homeless. That is not a problem for the study villages, because they are too far from population centers to be of value for development at present. Individuals can purchase parcels of land if they can afford to do so, in which case ownership transfers to them.

The only businesses in the village are run by women who are hairdressers, seamstresses or sell cooked foods (mainly for school lunches) and small stocks of canned goods and household items. Women also do much of the farm work because, as noted above, most of the men are usually away working for wages. Thus, most of the money that comes into the villages, aside from the sale of surplus farm produce, are the salaries for the teachers who live there, pensions to few government retirees, and funds sent by men working elsewhere who send money back to support their families.

1.3.5 Types of pumps used in study communities

The Community Water and Sanitation Authority of Ghana (CWSA) was established in 1994 to oversee the government's rural water supply program. It works within the framework of Ghana's decentralization program, and is the culmination of earlier attempts at addressing rural water problems by successive governments. These projects usually involve drilling boreholes and fitting them with manual hand or foot operated pumps. The wells are designed to be deep enough to ensure water supply in the dry season. As also discussed however, the pumps often break down within a short time, leaving people to fall back on traditional water sources (streams and open shallow wells).

The pumps being used in study communities are the Afridev, Nira, Vergnet and India Mark II and are shown in Figure 1.6. The Afridev, Nira and India Mark II are hand operated, whereas the Vergnet is foot operated. Following complaints about operational difficulties, the Vergnet is gradually being phased out. From 2008 to 2010, communities with broken down Vergnets got replacement handpumps of either

Afridev or India Mark II. However, Nira pumps have been used since 2011 because they have been found to be easier to maintain.

Figure 1.6. Types of pumps in study communities: From left; Vergnet, Afridev, Nira, and India Mark II

This page intentionally left blank

CHAPTER 2: LITERATURE REVIEW

This chapter reviews literature regarding recommended strategies for managing common-property resources in general and rural water facilities in particular. It also discusses known challenges to sustainable rural water supply and recommendations for addressing them. The literature is derived from works in three fields: common property resource governance, rural water supply issues, and gender dimensions of community development.

2.1 Sustainability of the Water Facility

Authors in the rural water sector generally agree that the ultimate goal of rural water supply programs is to ensure communities have an uninterrupted supply of clean water. For example, in their 2003 book *Community Water, Community Management,* Ton Schouten and Patrick Moriarty (Chief Executive Officer and Senior Program Officer, respectively, of the IRC International Water and Sanitation Center, Netherlands), outlined their vision of a "sustainable water system." In their view, for a water system to be sustainable, the water source itself must be capable of steady supply, the system should be equitable (that is, it should successfully cater to the water needs of the entire population in need of service and not just a few), and its infrastructural and institutional elements should be strong and flexible enough to accommodate future changes (Schouten & Moriarty, 2003, p. 2).

While working of a project to develop guidelines for sustainable handpump projects in Africa, Peter Harvey (an advisor to UNICEF) and Rob Reed (Senior Program Manager at the Loughborough University Water, Engineering and Development Center), developed a working definition for what constitutes sustainability in the rural water supply sector. Their definition was based on a synthesis of existing literature in the rural water supply sector. According to their definition, a sustainable water supply implies that:

> [T]he water sources are not over-exploited but naturally replenished, facilities are maintained in a condition which ensures a reliable and adequate water supply, the benefits of the supply continue

to be realized by all users over a prolonged period of time, and the service delivery process demonstrates a cost-effective use of resources that can be replicated. (Harvey & Reed, 2003, p. 115).

Harvey and Reed (2003, p. 118) also identified that constraints to sustainable rural water systems in four African countries (Ghana, Kenya, Uganda and Zambia) include policy limitations (insufficient opportunities for private sector participation), institutional challenges (nonexistent support for community management, aid restrictions, and use of inappropriate technology), financial limitations (difficulties in procuring needed spare parts, corruption), community issues (absence of a real need and appreciation for clean water, inability to manage water facilities, and unwillingness) and technological challenges (rigid rules concerning selection of handpumps which make it difficult to adopt more locally appropriate technology).

Similarly, in a report prepared for the South Africa Department of Water Affairs and Forestry, Abrams et al. (2003) noted that "sustainable water supply" implies that "water continues to be available for the period for which it was designed in the same quantity and at the same quality as it was designed. To them, a sustainable water system is one that is well built and has an adequate supply source, well received by beneficiaries ("customers"), with adequate funds for maintenance. They also identified "technical issues, social factors, financial elements, the natural environment, durable gender equity and empowerment, and institutional arrangements as factors that influence sustainability of rural water projects. While not elaborating on these factors, they do concede that there is no single key to ensuring sustainable water supply. Rather, all of these elements must be effectively addressed in other to ensure long-term success in water supply. They also recognize that the essential factors for sustainability can change over time, thus it is important to be sensitive to changes (Abrams et al., 2003, p. 3).

What these authors have done is document observed constraints to rural water sustainability. The observation by Abrams et al. (2003) that the determinants of sustainability can shift over time is especially relevant, given that the approaches to promoting rural water supply have evolved over the past

40 years. Just as strategies for meeting the needs for clean water supply have evolved from the centralized government approach to the realization that communities have active roles to play in managing their water facilities (Esrey et al., 1991; Schouten & Moriarty, 2003; Harvey & Reed, 2003), it is also essential that answers to sustainability should focus more on internal community dynamics than external factors.

Overemphasis on external drivers for project failures puts the onus on external entities rather than local residents' responsibilities toward their water facilities. Such a viewpoint works on the assumption that governments have overriding responsibility for maintaining rural water systems. It is also contradictory to some extent, given the current focus on community management. For example, blaming the lack of sustainability on the choice of technology fails to explain mass breakdowns of handpumps across the developing world, irrespective of the type of pump in use locally, and the fact that in many communities there has been a continuous cycle of external agencies stepping in to repair and replace broken handpumps.

This study was developed to fill a vacuum in the quest for sustainable rural water supply by offering a way to measure sustainability by observing the performance of existing water projects based on the recommendations given in the rural water literature and the application of Ostrom's principles for successful CPR management (discussed under Section 2.2).

2.2 Demonstrated Ability to Manage Local Projects

In 1968, Garrett Hardin introduced a theory that he described as "The Tragedy of the Commons." In an article bearing the same name, Hardin postulated that resources that are jointly owned and managed are doomed to failure, because users would be inherently more concerned with maximizing gains than ensuring long-term success of the resource in question (Hardin, 1968, p. 1244). The notion that users of common-pool resources are more motivated to exploit than preserve them led to proposals for either state control or privatization of common property resources (Wade, 1987).

In her seminal work more than three decades after Hardin expounded his theory, Elinor Ostrom offered a counter-argument based on a study of over 1,000 common property regimes. The results of these

studies, published in her book *Governing the Commons: The Evolution of Institutions for Collective Action*, effectively demonstrated that it is, in fact, possible for users of common-pool resources to manage their resources successfully and thus avoid collapse. Ostrom received the 2009 Nobel Prize in Economics for her systematic work that demonstrated that successful local management of natural resources is possible under the right conditions.

Ostrom's eight principles for a successful CPR management are 1) well-defined boundaries, 2) congruence between appropriation and provision rules and local conditions, 3) collective-choice arrangements, 4) monitoring, 5) graduated sanctions, 6) conflict-resolution mechanisms, 7) minimum recognition of rights, and 8) nested enterprises (multi-layered units of governance) (Ostrom 1990, p. 90). The principles are explained in Table 2.1.

Table 2.1. Design principles illustrated by long-enduring CPR institutions (Ostrom, 1990, p. 90.)

1. Clearly defined boundaries
   Individuals or households who have rights to withdraw resource units from the common-pool resource (CPR) must be clearly defined.
   The boundaries of the CPR must be well defined.
2. Congruence between appropriation and provision rules and local conditions:
   Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions.
   The benefits obtained by users from a CPR, as determined by appropriation rules, are proportional to the amount of inputs required in the form of labor, material, or money, as determined by provision rules.
3. Collective-choice arrangements:
   Most individuals affected by the operational rules can participate in modifying the operational rules.
4. Monitoring:
   Monitors are present and actively audit CPR conditions and appropriator behavior.
   Monitors are accountable to or are the appropriators.
5. Graduated sanctions:
   Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, officials accountable to these appropriators, or both.
6. Conflict-resolution mechanisms:
   Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials
7. Minimal recognition of rights to organize
   The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
8. Nested enterprises:
   Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Ostrom's work, in effect, revealed that the only tragic commons is the unmanaged one (Ostrom, 1990). More recently, Cox, Arnold, and Tomás (2010, p. 12) concluded—after a review of 91 studies—that Ostrom's design principles remain important criteria for measuring successful common property resources. They however observed that there is the need to consider other "critical social variables" such as "trust, legitimacy, and transparency" that account for the performance of common property resources.

An example of the impact of these variables is given by Chapin (2009, p. 46) who describes "cultural connections to the environment" as "powerful social forces that can foster stewardship and socio-ecological sustainability." Sillitoe (1998, p. 233) notes that development interventions would have greater chance of success if practitioners recognize that local communities possess a legitimate body of knowledge and "resource use practices," and endeavor to understand local knowledge and "management systems." Klooster (2000, p. 3) observes that users of common property resources "are not only embedded in specific historical sets of political and economic structures but also in cultural systems of meanings, symbols, and values."

Hence, it is worth investigating how traditional notions impact the management of the water projects. Indigenous African methods for managing natural resources were shaped by local rules and regulations, which were in turn, shaped by cultural and religious beliefs and practices. For example, the belief that deities resided in waterbodies, forests, particular plant and animal species shaped the lifestyles of people in Western Africa and influenced their worldview. Since waterbodies were revered as spirit beings with mystical powers (sources of both good and bad fortune), rivers and surrounding areas were protected as the abode of spirits. Thus, no farming was permitted within a thirty-meter range, and people were not allowed to bathe or do laundry near waterbodies (Sarfo-Mensah, Oduro, Antoh Fredua, & Amisah, 2010; Sarfo-Mensah & Oduro, 2007).

Sarfo-Mensah & Oduro (2007, p. 4) have identified three main types of indigenous natural resource methods in Ghana, based on observed patterns. These involve:

i. the protection of particular ecosystems or habitats (such as sacred groves and sacred rivers);

ii. the protection of particular animals or plant species (such as totem and tabooed species);

iii. the regulation of the exploitation of particular natural resources (enforced by such rules as annual closure seasons for harvesting or hunting).

No legal backing was needed to ensure compliance, because the existence of a wide range of prohibitions and accompanying penalties for disregarding them ensured strict observance. Hence, a belief system informed by notions of the sanctity of totem animals and plants, sacred groves and water bodies produced strict religious observations that ensured natural resource preservation and environmental cleanliness (R. Abrams, Anwana, Ormsby, Dovie, Ajagbe, & A. Abrams, 2009).

However, indigenous natural resource management methods have often been dismissed as part of the 'backward' past that the 'modern' nation had to move away from. In particular, penalties such as heavy fines, compulsory acts of atonement and banishment make the traditional ways appear arbitrary and unfavorable under the current democratic dispensation. Similarly, the religious connotations given much of the observations make it appear irrational to a Western educated population with an inquiring mindset. Changing cultural perceptions about the relationship between humans and the environment has considerably diminished the influence of indigenous resource management methods. The advent of Western influence and the introduction of Christianity have led to the erosion of the taboos and rituals that bound people to these beliefs (Sarfo-Mensah & Oduro, 2010; Abrams et al., 2009).

As noted, local management of natural resources has its challenges, but locally formulated rules are more likely to be accepted than externally imposed ones (Basurto, 2005; Dietz, Ostrom, & Stern, 2003). What appears missing from the traditional natural resource management approach in Ghana is a sense of stakeholder involvement in decision-making concerning the rules of resource use. Within this context, compliance to rules and regulations was driven by fear and not commitment. The elders and traditional priests established the rules, and everyone was supposed to either follow them or risk incurring the wrath of the gods, administered by humans. A potentially effective way to address the problems in

managing resources such as water, then, would be to adopt a hybrid between traditional management structures and democratic tenets in designing a governance system for resource use.

Institutions provide an essential platform for regulating the use of the resource. They reinforce the legitimacy of rules, establish avenues for monitoring observance and addressing disputes. Rules establish the guiding principles for use of the resource and have the potential to ensure fairness and equity in the governing process. According to Dietz et al. (2003), adapting rules to changing social-ecological conditions promotes successful resource governance. Norms set the tone for the use of the resource by influencing responses and attitudes to rules. Depending on the context, social pressure could either deter deviant behavior or condone it. Norms further provide the frame of reference for the formulation of rules, and research has shown that congruence between rules and norms enhances compliance and cooperation (Meek, 2012; Gruber, 2010; Ostrom, 2009, 1990; Basurto, 2008; Agrawal, 2003).

Globally, rural water supply projects were introduced in the 1960s as a response to public health concerns regarding the use of unsafe water. Due to its origins, rural water supply was largely perceived as a humanitarian program implemented through a centralized network of international aid agencies and national governments (Esrey et al., 1991; Schouten & Moriarty, 2003; Harvey, 2003).

The earliest attempts at incorporating community management into rural water supply projects occurred in the 1980s. The decision to involve local communities in the management of their water systems was made at the 1977 World International Conference on Water held in Mar del Plata, Argentina. This focus on community involvement was based on observations that the centralized approach to rural water supply was benefiting influential elites in the developing world, at the expense of the rural poor (Schouten & Moriarty, 2003).

It has been noted that the centralized method of rural water supply was fraught with limitations. For example, Allan (2005, p. 188) described it as being too steeped in the Western management paradigm that seemed to presume that the introduction of modern (improved) water source (boreholes) required 'modern' management methods. There is also evidence that the approach was bureaucratic and often

detached from reality. For instance, Akuoko-Asibey (1997) observed that the United States Agency for International Development (USAID) evaluation of rural water and sanitation programs in developing countries such as Ghana often failed to capture the full essence of the situation on the ground. A study in Ghana revealed that the government officials who were being relied on for information had no idea of the realities on the ground. In particular, views of bureaucrats compared with the personal observations of researchers and interviews from rural dwellers showed significant contrasts, revealing that the bureaucrats had little or no knowledge of impacts of water projects, even though they helped formulate it. This also revealed the shortfalls in feedback and communication between the government and program beneficiaries.

There was also the view that government institutions set up to manage natural resources were not suited to most rural communities and often failed (Akuoko-Asibey, 1996). In some cases, it created conflict among resource users who had hitherto operated on mutually agreed principles. A case in point is a problem that occurred in the Northern Region, where some rural water projects disregarded already existing household water rights and created conflict between users. It further restricted access to water in the dry season, compromising the flexibility, because the new system allowed only 'registered' users access to a specific facility (Eguavoen, 2008, p. 14).

The above stated challenges to centralized governance of water resources suggest that devolution would be a better fit. It should be borne in mind, however, that oftentimes seemingly progressive policies designed to enhance successful management of water resources also have unintended effects that create further barriers for sustainability. For example, in their study of community water governance systems in Tanzania, Cleaver and Toner (2006, p. 208) discovered that elements of devolution including "community participation, ownership and cost sharing" have the potential to create unequal access to the water resource, thus rendering them ineffective as tools for promoting sustainable water resource management.

My study affords the opportunity to examine the governance of locally managed water facilities. The study communities all have autonomous institutions for managing their water facilities. While the

NF/REDEP water program mandates the establishment of gender-sensitive WATSAN committees and recommends financial contributions, individual communities determine the exact composition of the WATSAN committees and ultimately decide whether to adopt a financial policy, and what type it should be.

2.3 Voluntary Participation in Community Projects

Like other common pool resources, water resources including rural water facilities could be successfully governed by establishing clearly defined rules in an environment of cooperation and collective decision-making. Ostrom's seminal work, and subsequent research based on the model she proposed for ensuring successful management of common-pool resources, has shown that fair and enforceable rules, equitable benefits, small group size, group homogeneity, and effective communication promote cooperation. To ensure observance, cooperation should be voluntary and monitoring effective (Ostrom, 2009, 1990; Chhatre & Agrawal, 2008; Garande & Dagg, 2005; Meinzen-Dick, DiGregorio, & McCarthy, 2004).

In particular, studies in developing countries like Ghana, Mali, India and Kenya indicate that participatory decision-making in rural water projects enhances cooperation and sense of ownership, which in turn increases chances of sustainable governance (Gruber, 2010; Carter, 2009; Gleitsmann et al., 2007; Engel et al., 2005; Prokopy, 2005). The active involvement of women is also recommended to ensure efficient governance of water projects, considering their central role in household water supply (Gender and Water Alliance, 2006a, 2006b; Doe & Khan, 2004; Wakeman et al., 1996). The presence of a strong social capital also enhances successful resource governance by exerting social pressure to conform to rules. Prior history of collaboration and the ability to enforce rules also strengthens the governance process (Agrawal & Benson, 2011; Prokopy, 2005; Agrawal, 2003; Meinzen-Dick, Raju, & Gulati, 2002).

Meaningful community involvement has long been identified as an essential component of development programs. In particular, participatory decision-making (where policy issues are collectively decided) has been linked to enhanced cooperation and greater involvement by the public, whereas

exclusionary methods lead to apathy. Studies in developing countries including Ghana, Mali, India and Kenya indicate that participatory decision-making in rural water projects enhances cooperation and the sense of ownership, which in turn increases chances of sustainable governance (Sam, 2011; Gruber, 2010; Ostrom, 2009; Carter, 2009; Iza & Stein, 2009; Gleitsmann et al., 2007; Engel et al., 2005; Prokopy, 2005). An ideal community development program, therefore, is one that has an inclusive management approach.

Ostrom (1995) recommends that as communities are not clear-cut entities, resource governance structures must take their inherent complexities into consideration. Swatuk (2005), Thomas (2002) and Tortajada (2010) bring attention to the need for program implementers to be aware of the social subtleties that could impact their work, given that development interventions take place within specific cultural contexts. Athukorala (1996) acknowledges that development practitioners require capacity development (in the form of targeted training) that will enable them to effectively fulfill their facilitatory roles in community development. Similarly, Huby and Stevenson (2003, p. 197) observe that rural water projects are prone to failure partly because emphasis is often placed on addressing perceived "technical issues" rather than examining social facets.

Although participatory governance has been promoted as beneficial to development interventions, development organizations have been criticized for not demonstrating strong commitment to its realization. Msukwa and Taylor (2011) point out that the assumption by external development agents that communities are homogenous entities is erroneous, and contributes to failures in development programs. Using a case study based on interactions with 548 villages in Tanzania, they discovered that individual financial benefits from development assistance differed by class and position, and that people participated based on perceived gains. Also, people who perceived themselves as being sidelined reacted by refusing to participate in community activities, a stance that is often met with penalties, which seems to reinforce the sense of exclusion. Similar findings were made in a study conducted in the Volta Basin of Ghana,

where a significant number of the poor participated actively in a community water project based on expected benefits and encouragement from project implementers (Engel et al., 2005).

It should be acknowledged that the communities within which the well-meaning ideals of participatory development and inclusive governance are introduced often have entrenched views and practices that make the implementation of a truly democratic system challenging. Unfortunately, repeated failures at finding a truly inclusive approach have led to concerns that development agencies merely pay lip service to inclusive governance, reducing "participation" to a buzzword rather than a deliberate strategy for creating desired outcomes. In particular, mainstream community development practitioners have been criticized for being reluctant to confront the established structures that perpetuate power imbalance (Robson & Spence, 2011; Buscher & Mutimukuru, 2007).

An important objective for this study, therefore, was to identify what obstacles, if any, exist to meaningful participation of all stakeholders in the study villages and to examine men's attitudes toward women's greater involvement in the projects. This included examining whether decision-making in study communities is participatory and whether meeting times are convenient for residents.

2.4 Active Role of Women Within the Community

Women and the poor have been identified as the most widely excluded groups in community decision-making; the poor due to their lack of power and influence, and women as a result of gender stereotypes that still accord them lower status in their societies. Women in the developing world, especially in Africa, usually have no decision-making power, are systematically excluded from policymaking, and have been conditioned to defer to male authority. Hence, the subjugation of women across the developing world is particularly pronounced in rural societies that hold strong traditional views, which poses an obstacle to active participation in development programs by women (Robson & Spence, 2011; Jingzhong, 2008; Acharya, Yoshino, Jimba, & Wakai, 2007; Jeris et al., 2006; Opare, 2005; Braimoh et al., 2004; Lucas, 2001; Kabeer, 1991). This is especially problematic when dealing with resources whose availability impacts women more than men, as in the case of water.

Considering that women in these societies have responsibility for household water supply, it is important that they have decision-making power about how water projects are managed (Sam, 2011; Gender and Water Alliance, 2006a). As Braimoh et al. (2004, p. 84) point out, the sustainable development goals of empowering people and enhancing their quality of life will not be attained if the subjugation of women continues. They recommend that "community-driven development programs" be used as avenues for correcting gender inequality. This call for gender-sensitive development interventions resonates with Robson and Spence (2011), who advocate that agencies take a more overt approach to fostering participatory decision-making in community development programs. The present study was an opportunity to evaluate the outcome of a community development program that actively encouraged women's participation in all aspects.

Calls for greater women's participation in community water projects have generated two approaches; appointing women to water management committees (which are administrative positions), and giving them technical training for maintaining the water facilities. The rationale for appointing women on water committees is to give them a voice in policy-making, while technical training offers a more hands-on involvement in maintaining the water facility. However, studies in Sri Lanka, South Africa and Ghana have shown that even when program implementers are compelled to appoint women to leadership positions, the women seldom get the opportunity to exercise this authority. These studies cite instances where husbands replaced women who were appointed to management committees, as well as examples where male committee members took up the responsibilities of their female counterparts. There is further evidence that communities that do not believe in inclusive governance of community programs adopt various strategies to exclude some members. Such strategies include scheduling meetings on days that are inconvenient for women and withholding information from less influential members (Msukwa & Taylor, 2011; Sam, 2011; Braimoh et al., 2004; Regmi & Fawcett, 1999; Athukorala, 1996).

Studies in Asia and Africa have indicated that training women to perform minor repairs on handpumps improves chances of sustainability by reducing rates of pump breakdown. Evidence from

countries like Nepal, India, Kenya and Ethiopia, where women have been trained as pump caretakers, shows that it increased their participation in water management because they are the primary users of the facilities. Conversely, the lack of active women's involvement has been linked to the collapse of several rural water facilities (Crowley, 2013; Asaba, Fagan, Kabonesa & Mugumya, 2013; Gender and Water Alliance, 2006a; Harvey, Ikumi & Mutethia, 2003; Regmi & Fawcett, 1999; Wood, 1993).

A further reason for encouraging inclusive governance in community development is that personal agency (an individual's capacity to influence and determine his/her life condition) is essential for promoting local ownership of the development process and empowering women (Cleaver, 2007; Sen, 2000; Wetmore & Theron, 1998). As Ajayi and Otuya (2006) observed, community development can only be achieved within an atmosphere of shared responsibilities and benefits as well as inclusive decision-making. Moreover, studies in Ghana and Mali have proven empirically that people become apathetic to development projects when they are not actively engaged in managing them (Sam, 2011; Gleitsmann et al., 2007).

The difficulties involved in implementing truly participatory program management show that it is not enough to add 'participation' to a project. Rather, concrete steps must be taken to ensure that the right conditions exist for full participation by all stakeholders. This should entail a move toward gender-sensitive strategies.

In researching rural water projects in agrarian Tanzanian villages, Huby and Stevenson (2003) discovered that decisions about household water use depended on income level, on the perceived costs of buying water, on the effort in contributing to the maintenance of a water point, or walking long distances to fetch water. With the average annual household income being $100, the authors observed that families opted to walk long distances, to fetch water that was sometimes polluted rather than pay to use a community pump or buy water from a vendor.

These findings draw attention to two significant issues based largely on the socio-cultural similarities between the Tanzanian villages and the study villages in Ghana. The first issue of

consideration is the nature of household decision-making, given the subjugation of women in both societies. Focusing on the household decision-making is especially relevant, because much of the inequality in gender relations plays out in the family arena (Braimoh et al., 2004). As a result, household decision-making patterns ultimately determine whether women would walk long distances to fetch water or pay for a more convenient water source. Being the primary users of water, women in the study areas will be less inclined to be active participants in the water projects if they do not have the authority to influence the allocation of household funds toward the maintenance of the water pumps.

Because the NF/REDEP program includes both the appointment of women on water management committees and training them to do minor repairs, this study offers a rare opportunity to evaluate these two different approaches to strengthening the role of women in managing rural water projects.

2.5 Widespread Understanding of the Benefits of Clean Water

The benefits of using clean water are well documented. For example, the introduction of clean water in rural communities in Asia and Africa has been credited with eradicating guinea worm and bilharzia in hitherto endemic areas, and for bringing reduction in infant mortality and morbidity (Harvey, 2008; Carter et al., 1999; Hunter 1997a, 1997b; Esrey et al., 1991, 1988). Carter et al., (1999, p. 1) recommend that effective rural water and sanitation programs in developing countries should be designed with "a clear understanding of the existing problems, the beneficial impacts achievable, and the factors that determine sustainability." While admitting that no single approach can solve the recurring problem of failed projects, researchers and practitioners advocate synthesizing different methods, such as community participation, financing for maintenance and sustaining benefits. A key determinant of successful community participation is the implementing agency's mode of operation. In Mali, findings through analysis of village records, participant observation and interviews revealed that people's discomfort with the method of community consultation, location of hand pump and the type of technology that was introduced resulted in low patronage of new water supply facilities. The perception was that the planning process did not adequately capture the preferences of the diverse social actors within the community.

Greater flexibility is therefore recommended in community development work in order to promote widespread participation (Gleitsmann et al., 2007).

Research has shown that the physical properties of common-pool resources—including water—have a significant influence on their governance. For example, in order to enforce use regulations, the resource in question must have clearly defined parameters. The ability or inability to exclude users influences willingness to regulate and comply with rules. In addition, users' perception about the yield capacity of the resource affects the manner in which it is utilized and governed. Thus, perceptions of scarcity may prompt more responsible and conservative management, while perceptions of abundance may lead to overuse and apathy about performance of the system (Agrawal & Benson, 2011; Ostrom, 2009; Agrawal, 2003, 2001; Esrey et al., 1991).

The location of the resource also influences the manner of use and governance. For instance, studies in developing countries have shown that the proximity of rural water facilities affects usage; people are more likely to use the improved water source when it is conveniently located (Carter et al., 1999; Esrey et al., 1991). Studies have shown that the performance of a social-ecological system is influenced by the interactions between its social and physical components (Anderies, 2006; Anderies et al., 2004). By extension, the performance of community water projects is determined by the interactions between the physical properties of the water system, the institutional arrangements governing its use, and social norms.

While much has been accomplished as a result of the above research on rural water supplies, an evaluation of these studies indicates that gaps remain. For example, almost all of the studies have examined single variables in isolation. For example, people have looked at how user participation, the role of women, or financial management impact the performance of rural water projects, but not how these might work together. This ignores the many potential synergies between variables. This limitation further highlights a key advantage of this study's approach, which is that examining several variables—

instead of focusing on single variables—facilitates a broader view of the drivers and a more effective way to identify specific challenges to sustainable management of rural water supplies.

Furthermore, many studies have recommended improving water projects through women's participation, but they have not followed up on how it impacts project performance. They also have not compared the pros and cons of putting a few women on water management committees versus training a few women in each village to be responsible for the basic maintenance of the pump.

CHAPTER 3: METHODS

This study uses the case study method as a primary means of investigation. A case study looks in depth at a few cases. It is not meant to be representative, but rather its purpose is to identify variables and relationships for further testing in a more representative sample. Berg (2007, p. 317) defines a case study "as a method involving systematically gathering enough information about a particular person, social setting, event, or group to permit the researcher to effectively understand how the subject operated or functions." Yin (1984, p. 23) describes a case study as "an empirical inquiry that: investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and its context are not clearly evident; and in which multiple sources of evidence are used."

Case studies use multiple data collection methods. In this study, I used key informants, focus group discussions, and secondary data as my primary methods.

3.1 Sample Population

This study was undertaken in eight villages (namely; Afranse, Atwereboanda, Awordo, Badukrom, Budukwaa, Etsii Abeka, Eyiakrom, and Ogoekrom), all located in the Ajumako-Enyan-Essiam District of the Central Region. Study villages were selected based on their location within the district (to ensure that they were spread out over different parts of the district), the presence of community wells with hand pumps, and their participation in a water program funded by a partnership of two Non-Governmental Organizations (NGOs): Nyarkoa Foundation (NF) and Rural Education and Development Program (REDEP).

I chose NF/REDEP project villages to study because their water program emphasizes many of the principles recommended in the literature, such as community consultation and involvement, establishment of water management committees, gender-sensitive programming, financing for sustainability, and health and sanitation education. Since not all of the villages are fully implementing each of these principles, they

also provide an opportunity to compare the results with and without these policies in villages that are otherwise similar in terms of religion, size, history, and demographics.

The following discussion outlines the six principles of the NF/REDEP Water Program that distinguish it from previous efforts by the government of Ghana that were focused on simply drilling wells, fitting them with hand pumps, and providing minimal provisions for sustainability. The government expected the communities to set up long-term maintenance systems for these hand pumps, but took no actions to help them do so. Many of the hand pumps the government installed were soon inoperable.

3.1.1 Community consultation and involvement

The absence of committed community involvement in development interventions has often been cited as part of the reason for failed projects. The NF/REDEP Program therefore seeks to engender community ownership by directly engaging in consultation with the people before work on a broken pump begins. The first stage of the project entails community consultation meetings, and repair and/or replacement of the broken pump is contingent on a clearly expressed commitment to the project on the part of the beneficiary community. Commitment of the total community is determined by a collective agreement to establish a gender-sensitive management team and to make regular payments toward the maintenance of the newly repaired hand pump.

3.1.2 Water management committees

A central part of fostering community involvement in the planning and management of the project, in order to ensure sustainability, is the establishment of five or seven-member Water and Sanitation (WATSAN) Committees in all beneficiary communities. The WATSAN committees were supposed to have been established at the time the wells were drilled and fitted with hand pumps by the government during the 1990s. However, they were either non-existent or not functioning in the communities where the NF/REDEP program was introduced. Part of the NF/REDEP program is to activate the WATSAN committees and train the members for their various duties. The committee is, in

turn, expected to continually engage the entire community in dialogue about the operation and maintenance of the water pumps. Decisions about water charges, schedule for operating the pump and its maintenance are to be made jointly by the entire community. The WATSAN committees' duties include holding regular community meetings, educating people on the importance of sanitary practices and keeping the pump site clean.

3.1.3 Gender sensitive programming

In order to address the customary exclusion of women from decision-making processes, the NF/REDEP program implementers included a requirement that the WATSAN committees have significant representation of women. The program also went further to encourage women to be active participants in the planning and implementation of the project. The implementers adopted this gender-sensitive approach based on documented evidence about the necessity for women's active participation in community water projects. (Gender and Water Alliance, 2006a, p. 18). Given the fact that they are traditionally responsible for household water supply, making women equal partners with men in planning and management is expected to afford them the opportunity to directly influence a project in which they have a major stake.

3.1.4 Financing for sustainability

As an incentive for the communities to save, the NF/REDEP also provides three years of support for maintenance, repair or replacement of the pump if communities demonstrate adequate financial commitment. This requires a financial contribution from residents toward the maintenance of the facility through water levies that are established by the WATSAN committee for each community. NF/REDEP requires the funds to be deposited into a bank account for future pump repairs or replacement.

3.1.5 Health and sanitation education

The NF/REDEP Program includes a community education component since many villagers do not know the importance of using safe water and practicing good personal and community hygiene.

It should be mentioned that success in the implementation of these approaches has been variable. Unfortunately, verbal support for financial contributions and gender-sensitive programming has not always translated into practical results in many project villages. Furthermore, the general lack of understanding of how diseases (other than guinea worm) are transmitted is a real barrier to getting people to take an interest in sustaining the water facilities. Some residents continue to disregard calls for exclusive clean water use, arguing that if drinking from the river was good enough for their forebears, it must be equally good for them. On the other hand, encouraging women's active participation has given women some leadership exposure through their work as WATSAN officers, even if their representation is nominal in some cases.

3.1.6 Training of local pump technicians

A recurring problem with hand pumps in the study villages is the absence of knowledgeable people to handle minor repairs. The result is that minor faults such as loose bolts are overlooked until they result in the total breakdown of the pumps. To address this problem, the NF/REDEP group and the staff of AMEFS Engineering Ltd. (the firm that does the installation and major repairs for the NF/REDEP water program) planned, organized and conducted a three-day training workshop in October 2013 to teach men and women from project villages how to perform minor repairs on hand pumps.

The training targeted women specifically, because they are responsible for household water supply, and are also more likely than men to remain in their communities and apply the skills learned. It was also part of the effort to empower women by equipping them with the skills to directly influence the performance of the water facilities. To this end, the program implementers had recommended that each community select two women to participate in the training program. In the end however, three of the villages selected men who had demonstrated remarkable commitment to the management of their water projects to accompany the women to the workshop.

These components of the NF/REDEP water program therefore made it possible to examine the performance of each project village to determine the extent to which they are being implemented.

Because of this variability, the program also provided insights into which variables are critical to a successful rural water project.

3.2 Data Gathering

This study employed qualitative methods (interviews, focus group discussions and examination of village records) to measure prospects for the sustainability of water facilities in study communities, examine evidence of demonstrated ability to govern local projects, financial management of local projects, voluntary participation in community projects, active role of women within the community, and widespread understanding of the benefits of clean water. As discussed in Chapter 1, the aim was to identify possible predictors of successful projects and successful outcomes by examining the characteristics present in villages that have successful water projects as well as those that are less successful.

Interviews were especially suited to this study because they made it possible to capture the nuances and socio-cultural context of participants' responses that are critical to research of this nature, and which could not be attained through quantitative surveys. The research objectives required that I gain insight into people's perceptions and motives, variables that cannot be easily quantified (Berg, 2007; Silverman, 2006; Kroeger, 1983).

3.2.1 Interviews and focus groups

Individual interviews involved five people in each community. Respondents were selected based on their position as village executives. In all villages, I interviewed traditional leaders (chiefs and regents) as well as members of the Town and WATSAN committees. Staff of the Rural Education and Development Program (REDEP) worked with local residents to help identify the leaders and executives who were interviewed. To ensure gender-balanced representation, at least two women leaders and executives were interviewed in each village. The total number of interviews with key respondents was evenly split 20:20 between men and women.

Individual interviews were then followed with community focus group meetings, which were designed to verify information obtained during the interviews. The meetings involved adult residents of study communities and were well attended, with participation ranging between 85 and 95 percent of the adult population in the respective communities. REDEP officials were also in attendance, as the forum provided an opportunity to hear from residents regarding the measures they had adopted to govern their water facility, and what the outcomes were. Aware that women often find it difficult to speak at such public meetings, I made specific efforts to draw them out and to encourage their participation. As a result, women in all study communities took active parts in the focus group meetings and expressed their views. Interestingly, the women drew attention to some of the most pressing issues that turned out to have significant impacts on the management of the water facilities. For example, women in two communities raised questions about water use rules that they considered unfair. In one instance, some women in one village complained that it was unfair to ban children younger than 10 years from operating the handpumps, because it prevented them from easing their workload by delegating water collection duties. In another village, a woman observed that it was unfair to set a fixed water levy for all households, as larger households end up contributing disproportionally less than smaller ones.

3.2.2 Participatory action research

As noted, development programs have the objective of not only improving the quality of life of beneficiaries, but also empowering communities to take charge of their own destinies (Ajayi & Otuya, 2006; Lucas, 2001). While external interventions are helpful in facilitating the development process, the community in question must ultimately play the central role in order to fully realize the goals of human advancement. For this reason, communities should be a vital part of the process of identifying challenges to successful program outcomes. Participatory Action Research (PAR) is well suited to a study of this nature because it brings development researchers and practitioners together with communities to explore new ideas and learn from each other (Msukwa & Taylor, 2011; Kobeissi, Nakkash, Ghantous, Saad, & Yassin, 2011; Kelly, 2005; Koch, Selim, & Kralik, 2002; Devasia, 1998).

The Participatory Action Research approach gives local communities the opportunity to take a central role in efforts to improve their lives, recognizing that people's experiences are shaped by their environment, and that accumulated knowledge from such experiences can be utilized in solving problems (Savin-Baden & Wimpenny, 2007). Considering the challenges facing community water supply programs, the PAR approach is a particularly effective medium for making communities active participants in creating sustainable water regimes.

Employing the PAR approach in this study involved adopting measures that enabled community participants to fulfill their roles as co-researchers. These measures included gathering community perspectives on what they would consider a sustainable project—what Kobeissi et al. (2011, p. 742) refer to as "local theories." Other measures included diagnosing challenges to project success and brainstorming ways to improve the situation through focus group discussions, and enlisting local women to monitor health and education data within their households.

3.2.2.1 Local women as researchers

As mentioned, local women in the study communities were recruited to record health and education data for their family members. No specific number was designated, as the aim was to engage as many women as possible. In the end, 49 women presented responses to the questions asked. To simplify the task, I asked them to record within a one-month period; 1) instances of their children's school absenteeism, and to assign reasons for that, and 2) any illnesses within the household.

Respondents raised the following questions, which were duly addressed:

What is the purpose of the exercise?

Some respondents recognized it as a way to identify challenges in regular school attendance and disease patterns within the community. Others thought that the information was being collected because some form of assistance was in the pipeline. To this, I explained that, while that was not its purpose, it was useful information to have in case the government or an NGO requested it.

The first round of study interviews was conducted in the village of Badukrom, and so the women in that village were the first to be recruited for the exercise. As a result, my experiences there provided lessons for interacting with women from the other study communities. After a few trips to Badukrom, I realized that I was not making any headway with efforts to get the women to record health and school data, so I decided to supply notebooks for the exercise. I bought 160 notebooks to be distributed to 20 households in 8 villages.

What happens when the woman in the house cannot read or write?

Many of the women aged 30 and older who were given the books were initially reluctant to participate because they could neither read nor write. In such cases, I recommended that the school children be asked to do the recording. In some cases, the men present offered to assist in recording the information.

Why are men not included in the exercise?

Not surprisingly, some men raised the question about why they were not included in the data collection exercise. Men in Badukrom were especially vocal about being left out. One insisted so strongly that I gave him a notebook after he told me he had already started collecting the requested information. However, most men were quick to point out that the exercise fit in perfectly with the women's responsibility of keeping track of household affairs.

Participants did return some data, but for the most part, the results were inconsistent and unreliable. For example, respondents made references to not just elementary school students, as requested, but also to those in high school and university. Often, some of the entries veered off-topic and instead included requests for financial and other types of personal assistance.

Some women were reluctant to participate in the exercise; those who made that clear were excused. However, not everyone who agreed to participate followed through. Of the 160 notebooks distributed, only 51 were returned (two of which had no entries).

This low return may have been caused by a lack of interest and the failure of point persons to distribute the notebooks as directed. In larger communities (basically every study community besides Badukrom), the notebooks were given to select interview respondents (by virtue of their leadership position in the community) to be distributed to 20 households. I learned later that some of those notebooks were never distributed. In Badukrom, I personally distributed the books to 20 households.

Miscommunication could have also played a part in the low number of responses. Somehow, the guidelines I had communicated to the local point persons became modified in transition, leaving recipients with inaccurate information.

Although it did not generate much useful information I felt it was still worthwhile because one of the main objectives of participatory research is to empower the participants, and this exercise certainly did so to some extent. Those who produced entries did so enthusiastically, recognizing that they were a part of something important.

In spite of the challenges, the main outcome was that there were a significant number of participants who were enthusiastic about participating. In addition, the lessons learned from this pilot study could be useful in designing future participatory research strategies.

3.2.3 Robustness analysis

Considering the high incidence of failures in rural water projects, it is vital to identify barriers to success. Robustness refers to the ability of a socio-ecological system to maintain its essential components in spite of changes (Anderies et al., 2004). In the context of community water supply systems, this type of analysis can indicate the ability to keep the water facilities operational in the face of inevitable breakdowns.

Robustness analysis is necessitated by the need to understand interactions that influence resource management. It offers the opportunity to identify and address barriers to successful management of common-pool resources. For example, an obvious factor accounting for poor management of community water projects would be noncompliance to rules and nonpayment of levies. Using the robustness analysis

framework would prompt a closer look at underlying reasons for noncompliance and nonpayment such as mistrust, negative past experiences, rivalry between village committees and political tensions (external influence) (Anderies et al., 2004).

Performing robustness analysis prompted a closer look at the reasons behind the performance of water projects in study communities and in establishing causality during data analysis. For example, this approach guided me to look beyond the results for financial management of local projects, prompting an in-depth look at the community characteristics that contribute to financial status of the various water projects. Within the broader scope of this study, robustness analysis prompts a more comprehensive assessment of challenges to successful rural water projects, thus enhancing the possibility of generating equally comprehensive solutions.

Besides recruiting local women to conduct research, PAR also influenced the identification of some of the study sub-variables. For example, the indicators used in measuring the level of financial management (including the type of financial policy and evidence of bank savings) were based on respondents' description of local rules and arrangements governing their water facilities.

The Participatory Action Research approach and Robustness Analysis were adopted because they are effective tools for facilitating mutual learning and exploration among development stakeholders. They were useful in identifying factors that influence successful water projects, and in exploring ways to overcome those hindrances.

3.2.4 Scoring criteria for each variable

The criteria used to score each variable are outlined in Table 3.1. Qualitative studies often generate masses of data–primarily words–and in order to evaluate it systematically, I developed a simple scoring method. Most variables were given scores based on a three-point scale, such as 0, 1, or 2 for "no, some or clear" evidence of a given characteristic. For example, the variable regarding whether the pump was working when I visited the village was given a score of 0 for "not working", a 1 for "working but obvious problems," and a 2 for "fully functional."

Table 3.1. Scoring criteria for each variable

Response Variable: Sustainability of the Water Facility								
Variable	**Scoring Method**							
Was it working at the time of study? (Physical condition of the pump at time of study)	Criteria	Not working at time of visit			Working, but problems obvious			Fully functional
	Score	0			1			2
How often has the handpump malfunctioned and was it promptly repaired?	Criteria	The handpump has malfunctioned in the past			The handpump has NEVER malfunctioned			
	Score	0			2			
How long did it take to get repairs? (Incidents of breakdowns, and how the community handled them [the longer it takes, the lower the score])	Criteria	Never malfunctioned	1-6 weeks	6-12 weeks	3 – 6 months	6-12 months	1-2 years	Over 2 years
	Score	6	5	4	3	2	1	0
Explanatory Variables								
A. Demonstrated Ability to Manage Local Projects								
Variable	**Scoring Method**							
1a. Established rules governing local projects	Criteria	Community has NO established rules governing local projects			Community DOES have established rules governing local projects			
	Score	0			2			
1b. The established rules are clearly defined	Criteria	The established rules are NOT clearly defined			The established rules ARE clearly defined			
	Score	0			2			
1c. The established rules are equitable	Criteria	The established rules are NOT equitable			The established rules ARE equitable			
	Score	0			2			
1d. The established rules are well enforced	Criteria	The established rules are NOT well enforced			The established rules ARE well enforced			
	Score	0			2			
2a. Conflict resolution mechanisms	Criteria	Community has NO conflict resolution mechanisms			Community DOES have conflict resolution mechanisms			
	Score	0			2			
2b. Effectiveness of conflict resolution mechanisms	Criteria	The conflict resolution mechanisms are NOT effective			The conflict resolution mechanisms ARE effective			
	Score	0			2			
3. Monitoring system	Criteria	Community has NO monitoring system			Community DOES have a monitoring system			
	Score	0			2			
4. Provisions for technical support (Residents know whom to contact for repairs)	Criteria	Community has NO provisions for technical support			Community DOES have provisions for technical support			
	Score	0			2			

Table 3.1. Scoring criteria for each variable (continued)

Variable	Scoring Method			
5. Diligence on pump maintenance ((Residents promptly call for repairs, and make serious efforts to address breakdowns)	Criteria	Community is NOT diligent about pump maintenance	Community IS diligent about pump maintenance	
	Score	0	2	
6. Cleanliness of the pump area	Criteria	The pump area was NOT clean at the time of unannounced field visit	The pump area WAS clean at the time of unannounced field visit	
	Score	0	2	
7. Role of leadership in managing water facility	Criteria	Community leaders have NO role in managing the water facility	Community leaders have a LIMITED role in managing the water facility	Community leaders have an ACTIVE role in managing the water facility
	Score	0	1	2
8. Predictability of rules and regulations governing local projects	Criteria:	The rules and regulations governing local projects are NOT predictable	The rules and regulations governing local projects ARE predictable	
	Score	0	2	
9. Responsiveness in enforcing rules and regulations governing local projects	Criteria	NO evidence of responsiveness in enforcing rules and regulations governing local projects	CLEAR evidence of responsiveness in enforcing rules and regulations governing local projects	
	Score	0	2	

B. Financial Management of Local Projects

Variable	Scoring Method			
10. Water fee policy (Is fee schedule set?)	Criteria	Water fees are not charged or easily waived	Water fees are charged by month	Water fees are charged at the water point
	Score	0	1	2
11a. Water fee collection	Criteria	Water fee is NOT collected	Water fee IS collected	
	Score	0	2	
11b. Water fee records presented	Criteria	No records are presented showing that water fees were collected	Officials are able to produce records showing that the water fees are actually collected	
	Score	0	2	
11c. Someone is employed to collect payments	Criteria	Community has NOT employed someone to collect payments	Community has employed someone to collect payments	
	Score	0	2	
11d. Lock times for pumps	Criteria	Community has NOT established and enforced lock times for pumps	Community has established and enforced lock times for pumps	
	Score	0	2	
12a. Able to present bankbook	Criteria	Could not produce bankbook for scrutiny	Produced bankbook for scrutiny	
	Score	0	2	

Table 3.1. Scoring criteria for each variable (continued)

Variable	Scoring Method			
12b. Evidence of regular contributions to savings account	Criteria	NO evidence of savings	Bank book showed SOME evidence of contributions to a savings account	Bank book showed evidence of REGULAR contributions to a savings account
	Score	0	1	2
13. Someone is employed to clean the water point	Criteria	There were no employees or volunteers to clean the facilities consistently	Relies on volunteers to clean facilities (evidence that volunteer system works sometimes)	Someone is employed who cleans the facilities reliably
	Score	0	1	2
14. Accountability and Transparency	Criteria	There was NO evidence of accountability and transparency	There was CLEAR evidence of accountability and transparency	
	Score	0	2	
C. Voluntary Participation in Community Projects				
Variable	**Scoring Method**			
15. Participatory decision-making	Criteria	Decisions are made by chief/regent WITHOUT input from community	Decisions are made with input from a FEW elders or council members	Decisions are made WITH input from community via public meetings
	Score	0	1	2
16a. Meeting times that are convenient	Criteria	Meeting times are NOT convenient for most or all residents	Meeting times ARE convenient for residents	
	Score	0	2	
16b. Meeting times that have strong participation by community	Criteria	Meetings do NOT have full participation by community	Meetings have SOME participation by community	Meetings have FULL participation by community
	Score	0	1	2
17. Sense of ownership toward local projects	Criteria:	NO evidence of sense of ownership	SOME evidence of sense of ownership	CLEAR evidence of sense of ownership
	Score	0	1	2
18. Sense of responsibility toward local projects	Criteria:	NO evidence of sense of responsibility	CLEAR evidence of sense of responsibility	
	Score	0	2	
19. Social Cohesion	Criteria:	NO evidence of social cohesion	CLEAR Evidence of social cohesion	
	Score	0	2	

Table 3.1. Scoring criteria for each variable (continued)

D. Role Of Women Within the Community				
Variable	**Scoring Method**			
20a. Women's influence in the community	Criteria	Women have NO influence in the community	Women have LIMITED influence in the community	Women have SIGNIFICANT influence in the community
	Score	0	1	2
20b. Women's active participation in decision-making	Criteria	Women have NO participation in decision-making	Women have LIMITED participation in decision-making	Women have SIGNIFICANT participation in decision-making
	Score	0	1	2
21. Level of women's participation in community efforts (Women's involvement, contribution and acceptance of organizational responsibility)	Criteria	Women have NO participation in community efforts	Women have LIMITED participation in community efforts	Women have SIGNIFICANT participation in community efforts
	Score	0	1	2
22. Impact of training women pump technicians	Criteria	Training women technicians has had NO impact on the performance of the water facility	Training women technicians has had LIMITED impact on the performance of the water facility	Training women technicians has had SIGNIFICANT impact on the performance of the water facility
	Score	0	1	2
E. Widespread Understanding of the Benefits of Clean Water				
Variable	**Scoring Method**			
23. Use of water facility	Criteria	Water facility is NOT being used exclusively (river and/or lake water, open wells and seasonal ponds are also used)	Water facility is being used exclusively	
	Score	0	2	
24. Knowledge of health importance of using clean water	Criteria:	Community is NOT aware of the health importance of using clean water	Community is aware of the health importance of using clean water	
	Score	0	2	
25. Level of support for charging for water (Note: some community residents are philosophically opposed to buying water. They feel it should be a basic right, even though it costs a lot of money to construct and maintain a water facility).	Criteria:	Community DOES NOT support paying for water	Community SOMEWHAT supports paying for water (supports in principle, but fails to follow through)	Community FULLY supports paying for water
	Score	0	1	2
26. Perceptions of reliability of water facility	Criteria:	Community DOES NOT have confidence in the reliability of the water facility	Community has LIMITED confidence in the reliability of the water facility	Community has FULL confidence in the reliability of the water facility
	Score	0	1	2
27. Attitude toward location of water facility	Criteria:	Community is NOT supportive of the location of water facility	Community is SOMEWHAT supportive of the location of water facility	Community is FULLY supportive of the location of water facility
	Score	0	1	2

3.4 Data Analysis

All interviews and focus group discussions were conducted in the local Fante language (which is the researcher's native language) and audio-recorded with consent from participants. They were then translated into English and transcribed. The list of variables presented in Table 1.1 was slightly modified to capture background information on study villages and the respondents, as well as new indicators (not mentioned in the literature), and used as an interview guide and focus group script. The interviews took the semi-structured format, allowing for open-ended responses. Details on the findings in each community are discussed in Appendix C.

Content analysis was performed manually by the author (without the use of computer software). Codes were based on the variables; i.e. interview responses were matched with corresponding variables, and then sorted by code. Sattler et al. (2015) used a similar approach in their study of governance structures adopted in community-based natural resource management in Brazil.

This page intentionally left blank

CHAPTER 4: RESULTS

This chapter is in two parts; Part 1 addresses the response variable (sustainability of the water facility) that influences the long-term performance of the water facilities, while Part 2 discusses the explanatory variables. 'Handpump,' 'pump' and 'water facility' are used interchangeably to refer to boreholes that are fitted with manual pumps (considered clean water sources in the respective communities).

4.1. Response Variable: Sustainability of the Water Facility

The purpose of this study is to identify community characteristics that lead to the successful outcome of rural water projects: that is; what characteristics are associated with water projects that are well managed and sustainable? What characteristics are associated with villages where water projects are not maintained? Knowing this, project managers of NGOs involved in developing rural water supplies should be better able to predict which villages would be likely to manage a water project well and thus result in a "sustainable" water supply.

This study assesses the extent to which the community characteristics mentioned in section 1.1 influence the sustainability of rural water projects. Sustainability is therefore the response variable, while the various characteristics are the explanatory variables. The sustainability of the community water facility in each village was determined by 1) functionality (was the facility working at the time of the field study?) and 2) the incidence of breakdowns (how often has the handpump malfunctioned and was it promptly repaired?).

4.1.1. Was it working at the time of study?

At the time of my fieldwork in 2013, two villages (Awordo and Etsii Abeka) had two handpumps, while the rest each had one. Seven of the villages had at least one handpump that was in working condition but may have needed maintenance. The handpump in Eyiakrom was working, but was not being used regularly because of unreliable water production.

Table 4.1 shows the year that the various handpumps were installed and the functionality of the water facility at the time of fieldwork (2013). The oldest facility was installed in 1982 and was 33 years old at the time of the study, while the newest was installed in 2008. The average age of the pumps was therefore just over 21 years.

Table 4.1. Year of installation for each handpump

Village	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
Year installed	1990	1984	1995, 2011	1984	2005	1982, 1983	2008	1984
Age (in 2015)	25	31	20, 4	31	10	33, 32	7	31

4.1.2. Has the handpump ever malfunctioned?

The pump in Badukrom is 31 years old and has never malfunctioned completely in 31 years of operation, although some parts have been replaced. The other communities have experienced periods when the pumps were broken, sometimes for months or years.

Mechanical problems with pumps range from minor—like bolts that weaken over time and eventually fall out—to major requiring new hardware parts or total replacement. Local residents can usually prevent minor problems with diligent maintenance. However, there were no trained pump maintenance people in any of the villages to monitor the facilities until October 2013, when the NF/REDEP project team trained local pump technicians. These technicians—mostly women—were then equipped to do the monitoring and given tools to make minor repairs before serious problems occur.

4.1.3. How often has the handpump malfunctioned, and was it promptly repaired?

Learning about the various ways study communities handled past water problems is important because this study seeks to identify variables that enhance success of community water projects. Information about how each community addressed water problems in the past reveals community priorities and resourcefulness.

With the exception of Badukrom, each community has dealt with pump failure at some point in time. At the time of the study, Atwereboanda was the only community whose water facility was not in working condition. The rest have faced breakdowns, but have managed to repair them. Sometimes they used their own resources, but at other times—such as when the repair costs were too high or there was the need to replace the pump—through support from NF/REDEP. In spite of the challenges with the Eyiakrom water facility, community leaders are still seeking ways to improve the community water supply, although the general population seems to have given up on that happening.

The main barrier to addressing serious repair issues is the lack of money to buy needed parts and to pay a mechanic. Until the time of the study, no participating community had ever borne the full cost of pump replacement, which could be in excess of USD3,000 including installation. Usually, communities that could afford to buy needed parts continued to do so until changing parts no longer solved the problem. Others grew weary of the continued maintenance expense and either gave up or sought support from NGOs to replace the facility.

Some communities are reluctant to spend money on repairs due to repeated encounters with unscrupulous pump mechanics. Several respondents recounted instances where they had been misled into either buying substandard parts, or swapping perfectly good ones for used ones. This explains why they were glad that, among other skills, the newly trained local technicians, primarily women, had gained insight into determining whether hardware really needs replacement when a mechanic says it does.

The absence of technical support and lack of knowledge about options for addressing breakdowns also accounts for some of the delays in repairing pumps. It is hoped that the quarterly monitoring visits currently adopted by the implementers of the water program (NF/REDEP) will eliminate such delays in future.

One interesting observation from the study was that the operations of these unscrupulous mechanics had inadvertently fed into local superstitious beliefs and influenced how some communities approached pump problems. For example, for years, residents in one community believed one handpump

that kept breaking down in spite of repeated repairs was bewitched. They attributed the frequent breakdowns to anger of the god of a spring that was close to that particular pump. Residents became convinced that the god was jealous that residents no longer used the spring and had therefore put a curse on the handpump. It later emerged that the mechanic had been installing used, worn parts, which explains why the pump kept breaking down. However, years later, some respondents in that village still believe the pump was bewitched.

The rational for the scores on how long it took to get repairs is discussed in Table 4.2. The highest score is 6, and indicates that a handpump has never had a serious malfunction resulting in a complete breakdown. The lowest score is zero, denoting a handpump that has not worked for over two years. As noted above, Eyiakrom is the only community that scored a zero on sustainability, but the problems are beyond the capability of the residents to solve. The second part of this chapter throws more light on the unique challenges faced by that community. As reflected in the score, the handpump in Badukrom has never broken down, giving that village a score of 6. On the other hand, the Eyiakrom facility's struggle to produce water since its installation in 2008 is reflected in a zero score.

Table 4.2. How long did it take to get repairs? (Arranged from high to low score)

Village	Score	Rationale
Badukrom	6	One handpump, no serious malfunction since its installation. Village has consistently saved money for repairs and has laws in place to ensure efficient management.
Afranse	5	Both handpumps have malfunctioned intermittently, often for several weeks. The village makes an effort to repair facilities when they break down. Savings and management efforts have improved since 2009, when the first pump replacement was done.
Budukwaa	4	The one handpump has had at least two breakdowns since its installation. The most recent lasted over a month before they could raise the money to repair it. The community managed to repair it each time, but there have been no improvements in savings since then. Rules of use have been established but are not being observed.
Etsii-Abeka	4	The village has two handpumps, both of which have malfunctioned at some point over the years. Breakdowns often last for weeks while residents work to raise funds for repairs. In spite of these experiences, the community had made no improvements in saving and managing the facilities and continues to be vulnerable to breakdowns.
Atwereboanda	3	One pump, a Vergnet, has had intermittent failures, often lasting months. The community sought NGO assistance in 2008 because it had no funds to repair the Vergnet. No efforts have been made to save money for future repairs since then, and residents have disregarded user rules. The community dislikes the location of the pump because the ground becomes wet and swampy during rainy seasons and they have avoided using it for that reason.
Awordo	3	Both handpumps have malfunctioned at some point since their installation. The community repaired the facilities each time, and has improved revenue collection and management.
Ogoekrom	3	The only handpump has had several breakdowns over the years that often lasted months. The facility was eventually repaired with NGO assistance, and residents have established rules to ensure a more responsible use and better financial preparedness.
Eyiakrom	0	The handpump has a low water yield and is seldom utilized. Residents have made several attempts over the years to improve water flow without success. At the time of this study, the community had established user rules, though residents were not observing them. This is because they do not perceive the handpump as a reliable source of water due to its low yield.

Table 4.3 is a summary of scores concerning the sustainability of water facilities in participating communities and shows the assigned scores. For functionality, a score of 2 indicates that the handpump was fully functional, 1 denotes a working handpump with obvious problems, while a zero means the facility was not working at the time of the study. The benchmarks used in measuring study variables are outlined in section 3.3.3.

Table 4.3. Scores for sustainability of water facilities

Benchmark	Badukrom	Awordo	Etsii Abeka	Budukwaa	Afranse	Ogoekrom	Atwereboanda	Eyiakrom
Was it working at the time of study?	2	2	2	2	1	2	1	0
Has the handpump ever broken down?	2	0	0	0	0	0	0	0
How long did it take to get repairs?	6	5	4	4	5	3	3	0
Total for Sustainability, the dependent variable	10	7	6	6	6	5	4	0

Findings on the sustainability prospects of the study communities highlight the underlying conditions that influence the long-term success of rural water programs. Handpumps need to be constantly maintained in order to keep them operational, and communities need to be in the position to prevent the facilities from collapse. The explanatory variables discussed below offer insights into the specific factors that enhance the long-term success of rural water facilities.

4.2. Explanatory Variables

As discussed in the methods chapter, there are five categories of explanatory variables, with several variables in each category.

4.2.1. Demonstrated ability to manage local projects

This category indicates whether study communities possessed effective mechanisms for managing existing projects, and discusses the nature and import of such mechanisms. The variables used in measuring demonstrated ability to manage local projects were:

1. Clearly defined, equitable and well-enforced rules governing local projects
2. Effective conflict resolution mechanisms
3. Monitoring
4. Provisions for technical support (knowing who to contact for repairs)
5. Diligence on pump maintenance

6. Cleanliness of the pump area

7. Role of leadership in managing water facility

8. Predictability of rules and regulations governing local projects (water or other projects)

9. Responsiveness in enforcing rules and regulations governing local projects

There are three types of projects in study communities that can be evaluated for this category. They are: 1) shared water facilities, 2) environmental health projects, and 3) educational projects.

The environmental health projects generally revolve around mandatory community cleaning exercises that are held weekly and the requirement that individual households keep their surroundings neat. The only exception to the nature of the community environmental projects is Eyiakrom, where two outside NGOs have initiated health and sanitation projects.

The school projects involve local efforts and contributions to build elementary schools within the communities. Such projects show that the local people can take the initiative to get these built, which demonstrates some ability to manage local projects. Educational initiatives range from lobbying the government to start a local school (in the case of Awordo, Eyiakrom, Budukwaa and Etsii Abeka), building a makeshift school structure out of local products (mud, bamboo and palm fronds as in Eyiakrom), and employing a preschool schoolteacher in the absence of government support (Budukwaa). Educational contributions include providing support to educational ventures initiated by government and/or NGOs, often in the form of labor and food. For example, Badukrom's contribution to an NGO-sponsored preschool building in the community was to provide labor to assist the contractor and food to the workers building the school. Respondents in Eyiakrom and Awordo also recounted contributing money and labor to the construction of their respective schools.

Maintaining the water facility, including the pump, keeping the pump area clean, and ensuring that there is adequate drainage to avoid puddles and wet ground that provide breeding areas for mosquitos, is the only effort that involves a shared natural resource. The school projects are one-time

undertakings, whereas the community cleanliness and water facility operations are ongoing. Thus, most of the indicators outlined above are relevant only to those two projects.

4.2.1.1. Clearly defined, equitable and well-enforced rules governing local projects

All study communities have clear rules regarding their projects. The rules governing the environmental health and educational projects are standard across all communities. All residents are obligated to contribute to efforts toward the establishment of a community school, keep the areas around their homes clean, and participate in joint weekly cleaning exercises.

The rules governing the water facility, on the other hand, vary from village to village (as shown in Table 4.4). For example, some villages have decided that children under 10 years of age (i.e. "under-age children") are not able to properly operate the handpumps, and that mishandling them by children contributes to frequent pump breakdowns. As a result, several communities have declared it unlawful for underage children to operate the facilities. Others have elected to lock the pumps in order to enforce payment of water fees and keep children away from the pumps. Additional rules involve scheduled cleanings of the pump area and bans on wearing footwear on the pump platform.

Table 4.4. Rules governing the water projects in study communities

Rule	Where adopted
Locked pumps	Awordo, Badukrom
Monthly levy	Budukwaa, Etsii Abeka, Ogoekrom
Pay-to-fetch	Awordo, Badukrom
Ban on operation by underage children	All villages
Scheduled cleaning	All villages except Awordo
Pump caretakers are paid to clean	Awordo
Ban on footwear on platform	Budukwaa, Ogoekrom

Table 4.5 is a list of projects being undertaken in study communities, outlining enforcement mechanisms as well as penalties for noncompliance.

Table 4.5. Types of projects in study communities, indicating rules, enforcement mechanisms and penalties for noncompliance

Type of Project	Rules	Enforcement Mechanism	Penalty for noncompliance
Environmental health	•Mandatory weekly joint cleaning exercises. •Mandatory maintenance of clean backyards.	Threat of penalty	Fines/summons to chief for refusal to participate in joint cleaning exercise without prior permission or to keep backyard clean.
Education	Mandatory participation in chosen method of involvement.	Threat of penalty and potential stigma of being viewed indifferent to community progress.	•Fines/summons to chief for refusal to participate in joint venture •Stigma of being viewed indifferent to community progress.
Water	•Closures •Payment of monthly dues •Pay-to-fetch •Cleaning schedule •Ban on operation by underage children •Scheduled cleaning •Ban on footwear on platform	•Putting facility under lock. •Denial of access (in the case of pay-to-fetch). •Applying constant pressure •Threat of penalty •Threat of public shame (never actually carried out) •Constant vigilance	•Fines/summons to chief •Police action

Determining the equity of rules requires analyzing the ways in which they affect the wider community. The environmental and school projects appear to have minimal potential for inequity, given that residents have the opportunity to exempt themselves from participation with prior notice to village leaders. Moreover, the elderly and infirm are customarily exempted from such strenuous work as community clean up exercises and physical labor contributions to school projects. Fines for noncompliance could be potentially unfair to individuals who struggle to make ends meet, though one could argue that this presents a strong incentive to avoid incurring a fine.

In all villages, water use rules such as closures (locked periods), ban on operation by underage children and the pay-to-fetch system raise questions about equity. Communities that practice closures usually make allowances for exceptions so that adults and children aged 10 or older have access to the facilities outside the designated lock times. However, this does not work for all residents, because many

women need to delegate water chores to their younger children. In fact, women in one community (where the ban on use by underage children was established, but the facility not locked) cited the inconvenience of not being able to designate water duties to younger children as the reason behind their refusal to obey the rule.

The pay-to-fetch system of payment has the potential to exclude users who regularly have too little money to pay for water as they need it. Some communities have granted exceptions to only elderly and disabled people they consider in need of assistance, arguing that everyone else should find the money to pay. The implications of financial arrangements will be closely discussed in the next section.

The capacity for effective enforcement of rules depends on the extent to which enforcement mechanisms impact residents. I identified two types of enforcement mechanisms; one is the personal cost for noncompliance, and the other is the instituted penalty for noncompliance. The personal cost for noncompliance refers to the consequences that individuals face as a result of refusal to follow regulations. Examples include being denied access to water for failing to pay water dues and being made to pay a fine for disregarding community rules. Instituted penalties refer to established community policies for dealing with noncompliance.

Generally, the stronger the personal cost of noncompliance, the greater the incentive for cooperation. Some rules appear to have built-in enforcement mechanisms. For example, in communities with pay-to-fetch and closure rules, refusal to pay means automatic loss of access to the water facility. Hence the fear of being denied access becomes a strong incentive to comply with the rule.

Threats and penalties did not appear to generate as much motivation to cooperate as denial of access to the water facility, because the effects of the latter are more immediate. In fact, few villages actually carry out the penalties, a fact that residents are very much aware of. For example, leaders in one village often threaten to publicly shame payment defaulters by mentioning their names at community meetings. However, this threat has never been carried out, because as one respondent stated, "the fact is we can't expose people like that, because we're one people. We can only keep encouraging people to

pay." The law prohibiting wearing footwear on the pump platform is equally difficult to enforce, because it requires constant vigilance by the pump caretakers. That is usually not feasible.

4.2.1.2. Effective conflict resolution mechanisms

All communities have some mechanism for resolving conflicts arising out of enforcement of rules. Mediation is the standard form of conflict resolution identified in the study communities; residents report all conflicts to the chief and elders who then call the parties involved to establish culpability. Typically, anyone found guilty of aggression against a village official in the course of duty is fined, and recalcitrant people are reported to the police. According to one respondent, any attack on a village official engaged in the course of duty is considered a direct attack on the chief and merits disciplinary action.

Generally, residents who disapprove of some aspect of the community rules do not appear to have any recourse. Rules are either adopted through verbal agreement at meetings (in which case the majority wins), or decreed by leaders. The implications of participatory decision-making will be discussed in a subsequent section.

4.2.1.3. Monitoring

Monitoring was observed in two ways; one internally initiated and the other external. Local leaders and executives perform the internal monitoring, whereas the NF/REDEP program team conducts the external monitoring.

Town committee officials (who represent the chiefs and elders) are directly in charge of coordinating all village efforts, including the environmental health and educational projects. However, separate, community appointed Water and Sanitation (WATSAN) committees have direct oversight of the water facilities. Eyiakrom is an exception because of the involvement of two outside NGOs; it has a separate committee for each of its three projects (sanitation, water and health). Hence the town committees coordinate community efforts toward school construction, weekly cleaning exercises, and also monitor household backyard sanitation. The WATSAN committee monitors the performance of the water facilities.

Technically, the above-named committees are in charge of monitoring projects, but the monitoring is only as effective as the body conducting it. Hence, though each community has a WATSAN committee (as required by the terms of the agreement with the NF/REDEP program), their performance was found to vary from highly effective to incompetent. To address that, NF/REDEP—along with the engineering firm that handles repairs and installations (AMEFS)—visit project sites every quarter to monitor performance. It is a move that is calculated to identify and address problems before they escalate. The implementers of the health and sanitation projects in Eyiakrom also conduct periodic monitoring.

This external monitoring approach has ensured that the relationship between the communities and program implementers remains active. Regular monitoring by the program implementation team offers technical support that would otherwise not be readily available. The inability to obtain technical support is a problem that rural communities face, and is a leading cause for delayed pump repairs. Generally, the farther the community is from the main road network, the more difficult it is to access help. The quarterly monitoring meetings therefore solve this problem by offering timely and convenient technical support.

Another point worth emphasizing is that visiting technicians support the local pump technicians' efforts to do regular maintenance and help enhance their status in the communities.

There is also evidence that the quarterly monitoring approach encourages more responsible management of water facilities by demanding more accountability from community members. For example, the persistent reminders to save money, or at least deposit whatever is collected in a bank, have yielded results in one village (Etsii Abeka). At the time of fieldwork in 2013 this community had made no deposits since February 2012, when the account was first opened, and the balance stood at the opening balance of GHC20. At the time of the monitoring visit on April 24, 2015, the balance had increased to GHC272. The bankbook also reflected a more recent deposit (April 22, 2015). However, the community continues to struggle with payment of water fees and transparency in the form of rendering account to residents.

Reports from the 2015 quarterly monitoring visits have also shown that Ogoekrom has followed up with its plan to lock the facility to prevent misuse (as expressed during the 2013 interviews), and that Badukrom continued with its outstanding management of the water facility.

4.2.1.4. Provisions for technical support (know who to contact for repairs)

The water facility requires technical support and, at the time of the study, all participating villages said they had designated people to contact NF/REDEP if their pumps develop problems. The WATSAN committee is in charge of reporting faults in some villages, whereas the town committee has that responsibility in others. Aside from calling for professional support, the trained pump technicians are equipped to handle minor technical problems.

4.2.1.5. Diligence on pump maintenance

Residents' level of diligence in maintaining their water facilities was reflected in the efforts made to prevent malfunctioning of the water facility, and steps taken to correct faults once they have occurred. With the exception of Atwereboanda, all participating communities had either prevented a total collapse, taken active steps to repair their facilities once it broke down, and/or adopted measures to reduce chances of malfunctioning. While not all the measures were being implemented successfully, the fact that residents had deemed it relevant to establish them represented a positive shift in those communities.

Having access to external technical support and trained local people who can to do routine pump maintenance and watch for signs of wear further enhanced diligence, although this still requires community commitment. This explains why, although all the communities have access to technical support and trained community members, Atwereboanda was yet to exhibit any clear signs of diligence toward its water facility. On the other hand, Eyiakrom, the community whose facility has consistently failed to meet its residents' water needs, still earns a positive score, because its leaders continue to actively seek solutions to their water problem.

4.2.1.6. Cleanliness of the pump area

As mentioned, most communities had established cleaning schedules, thought not all were observed. The pump platforms and immediate surroundings in all but three communities were observed to be clean during the field visits in 2013.

4.2.1.7. Role of leadership in managing the water facility

The central role of traditional leaders has been to give backing to WATSAN and village committees to perform their duties. However, some leaders go beyond that and get directly involved in coordinating projects. In some communities, these leaders work jointly with WATSAN officials to manage the water facilities. In Badukrom, for instance, one of the two headwomen is in charge of the day-to-day management and coordinates affairs with WATSAN members. She holds the keys to the handpump and collects the money.

In Afranse and Budukwaa, the management of the water facilities is a joint effort between the WATSAN committee and the village committee, with both groups working in concert to establish rules and enforce them. Technically, the WATSAN and village committees in Awordo are supposed to be working together, but findings from the quarterly monitoring visits have unearthed conflict between the two committees. The chief in Eyiakrom also works closely with the WATSAN committee, and has taken the lead in finding solutions to the problem of low water supply from the community pump. The WATSAN committee in Atwereboanda is ineffective because the residents disregard all its directives. There is hope that a partnership with the village committee will promote cooperation among residents. In Etsii Abeka and Ogoekrom, WATSAN members are managing the facilities in concert with the women pump technicians. However, there are barriers to inter-committee collaboration, such as the persistent conflict between the WATSAN and town committee in Awordo, and reported rivalry between the WATSAN and Sanitation committees in Eyiakrom.

4.2.1.8. Predictability of rules and regulations governing local projects

Rules governing participation in local cleaning exercises, educational support efforts and the use of the handpumps have existed in all the communities for a number of years, so residents are largely familiar with them.

4.2.1.9. Responsiveness in enforcing rules and regulations governing local projects

Elements of responsiveness identified during the study include flexibility in enforcing water use fees, and exemption from joint cleaning exercises. Flexibility in enforcing water dues occurs in two ways; offering leniency to the aged (adopted in all villages), and suspending collection due to financial hardships (as in Budukwaa). Similarly, residents receive exemption from joint cleaning exercises if they are aged, infirm, or seek prior permission from leaders.

Table 4.6 gives the detailed scores for demonstrated ability to manage local projects, while Table 4.7 summarizes the key findings, including total scores for this variable.

Table 4.6. Scores for demonstrated ability to manage local projects

(2 points possible for each benchmark)

Benchmarks	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
Clearly defined, equitable and well-enforced rules governing local projects	2	0	2	2	1	1	1	1
Effective conflict resolution mechanisms	2	1	2	2	1	1	1	1
Monitoring	2	1	2	2	2	2	2	2
Provisions for technical support (know who to contact, etc)	2	2	2	2	2	2	2	2
Diligence on pump maintenance (tighten bolts, watch for signs of wear, etc)	2	0	2	2	2	2	2	2
Cleanliness of the pump area	0	0	2	2	2	0	2	2
Role of leadership in managing local projects	2	1	2	2	2	1	2	2
Predictability of rules and regulations governing local projects	2	0	2	2	2	1	2	2
Responsiveness in enforcing rules and regulations governing local projects	2	0	2	2	2	0	2	2
Totals	**16**	**5**	**18**	**18**	**16**	**10**	**16**	**16**

Table 4.7. Key findings on demonstrated ability to manage local projects (in order by highest score)

Village	Total Score	Rationale
Awordo	18	Reports about past efforts in spearheading the construction of a community Junior High School and continued active involvement in school management provide evidence of efficient management of other local projects. For the water project, residents have clearly established rules that are enforced through pump closure and on-site collection of water fees. Weekly communal cleaning sessions that are well attended; appointment of village executive committee to manage project; concrete efforts made to ensure compliance with rules.
Badukrom	18	Badukrom has one handpump, which is kept under lock and opened early morning and late afternoon. The community has donated land for the construction of a nursery school being financed by a nonprofit, and also provided labor for the project. The village has established clear rules to manage its water facility in the form of stipulated fees and strict lock times. Residents' eagerness in providing coordinated support for the school project is also commendable.
Afranse	16	Joint efforts of WATSAN and village committee led to the adoption of new regulations: a) Pump is locked and a caretaker employed to clean area and collect money. b) Children under 10 years old are not allowed to operate the pump. c) Patrons are expected to leave footwear outside the pump platform to avoid contamination.
Budukwaa	16	Budukwaa has one handpump and an open well that only produces water in the rainy season. A food-processing company operating in the area provided the handpump in 2005, upon request from the community. The community is also managing a preschool that was built by the same company. The chief, elders and village officials jointly manage all community projects. In the case of the water project, WATSAN committee works with this leadership team. The community has established a chain of command in handling problems with the water facility: the WATSAN committee informs the regent, who then calls the elders and the town committee. After deliberations, the leaders call in a technician to repair it. The rules concerning the use of the water facility include monthly household levies, which are currently not being enforced, and a ban on wearing shoes on the pump platform so as to prevent pollution. According to one respondent, the latter is difficult to enforce because it requires the constant vigilance of the pump caretakers, which is not always possible. The community has been managing the preschool effectively, shown diligence in repairing the handpump when it broke down, and exhibited remarkable teamwork between the village leadership and the WATSAN officials. However, to receive full points all laws must be fully enforceable and effective, which is not the case here.

Table 4.7. Key findings on demonstrated ability to manage local projects (continued)

Village	Total Score	Rationale
Eyiakrom	16	Eyiakrom currently has three projects: water, sanitation and health. Each project has a management team comprising members of the community. The water and sanitation projects are governed by set rules. The sanitation project requires residents to maintain good environmental hygiene through cleaning and establishing designated garbage disposal points, and to build community and household latrines. The community latrines have been constructed, household latrines are in various stages of completion, and residents hold weekly communal cleaning exercises. The community also has a designated garbage disposal point. The rules governing the water project include closure and charging a fee per bucket fetched (water point collection). According to respondents, several attempts to lock the handpump have been unsuccessful as the lock gets broken every time, leaving it open for people to fetch without paying for it. The pump does not produce enough water to be useful (a few liters every hour or so) so people do not really have an interest in taking care of it. The health team consists of local volunteers who work with public health nurses to monitor geriatric, child and maternal healthcare. Besides the three projects, the community has also assisted in building two classroom blocks, and remains actively involved in the community school. There is clear evidence of effective management of two out of the three ongoing community projects. Respondents admitted that residents have been cooperative in following the directives of the health and sanitation team, but have systematically ignored those of the water committee because the handpump does not meet community needs.
Ogoekrom	16	Ogoekrom has one handpump and a functional WATSAN committee. The community has instituted monthly water levies for women while men are expected to bring in contributions from paid labor. This system was however not being observed at the time of the study.
Etsii Abeka	10	Etsii Abeka has two handpumps. According to respondents, earlier efforts to sell water by the bucket failed, but water levies have now been introduced. Rules: For example, women were supposed to clean the pump area, but this was not enforced and there were no penalties for refusal to clean. Conflict resolution: the protocol for handling defaulters is to apply constant pressure and summon them to the chief/regent for questioning. The community has a WATSAN committee that oversees the two water facilities. They report all faults to the town committee, who subsequently inform the regent and the elders. The community appears to have a well-established leadership team consisting of the town council, the regent and elders, and WATSAN committee. However, there was little evidence of coordination among the leaders. WATSAN officials expressed frustration at the leaders' delay in calling a meeting to receive feedback from the workshop to train the pump caretakers. The trained pump technicians regularly monitor the handpumps, tightening lose bolts and watching for first signs of a fault. The treasurer had also taken to cleaning the facilities since the other women have failed to do so. Both water facilities were fully operational at the time of fieldwork. The WATSAN committee members appear to take their duties seriously, regularly monitoring the facilities to ensure smooth operation. WATSAN officials and village leaders work together to repair the facilities when they breakdown. In the absence of stipulated sanctions, some residents appear to have no motivation to pay the levy.
Atwereboanda	5	WATSAN members keep telling residents not to allow children to operate the pump, but people ignore them. The two town committee members interviewed resolved to take up the matter by calling a meeting to decide on rules such as whether to close the pump, sell water, pay monthly dues, or wait to collect money for repairs when the need arises. The village has stipulated measures for dealing with residents who refuse to pay dues and participate in communal work—fine or be reported to the police.

4.2.2. Financial management of local projects

Determining the level of financial management of local projects in study communities involved evaluating whether a fee schedule had been set, and fees actually collected. In addition, was money being saved in a savings account and how much was available if needed for the project in question.

In all villages except Eyiakrom, the only project requiring financial management by residents is the water facility. However, as part of the health project in Eyiakrom, one member of the health team stores first-aid supplies for the community. According to respondents, the first supplies were donated by the NGO that initiated the project, but subsequent restocking has been financed with proceeds from the sale of the first batch. This restocking of the supplies demonstrates some financial management of a local project because money needs to be saved to keep the supplies complete.

4.2.2.1. Water fee policy (Is a fee schedule set?)

Water user fees in study communities are either collected monthly or charged per bucket (pay-to-fetch). Communities that collect monthly water dues charge either per household or per adult resident and typically enforce payment through house-to-house collection. Those communities that charge per bucket collect money at the water point.

Four villages (Awordo, Badukrom, Eyiakrom and Afranse) have officially adopted the pay-to-fetch system of water revenue collection. Etsii Abeka, Ogoekrom and Budukwaa have instituted monthly water levies; Etsii Abeka charges per adult and Budukwaa per household. In Ogoekrom, women are expected to pay flat levies while men jointly contribute through proceeds from paid labor. Atwereboanda has no established policy, because residents lost interest in paying for the water when those in charge failed to render accounts after a year of selling the water. These findings are outlined in Table 4.8.

Table 4.8. Types of financial policies adopted in study communities

Financial Policy	Where Adopted
Pay-to-fetch	Awordo, Badukrom, Eyiakrom and Afranse
Monthly Levy – per household	Budukwaa
Monthly Levy – per adult	Etsii Abeka
Monthly payment + labor proceeds	Ogoekrom
No Financial Policy	Atwereboanda

4.2.2.2. Are fees actually collected?

Although seven of the study communities have a financial policy, its implementation is another story. Findings showed the pay-to-fetch system as the most effective at ensuring that residents pay user fees. All the communities that have instituted monthly levies reported irregular payment.

Four out of the eight villages (Badukrom, Afranse and Awordo) were collecting fees on a regular basis. Awordo and Afranse have employed pump caretakers to collect water point payments. As already mentioned, one of the headwomen in Badukrom is in charge of collecting the money, while a WATSAN official has been appointed to do same in Eyiakrom (although payment is not consistent).

The communities that enforce payment appear highly motivated to do so. Badukrom, for instance, is conscious of its vulnerabilities and the distance to the nearest water source, and is therefore taking steps to avoid the situation where the facility breaks down and there is no money to repair it. As one respondent put it: "We are a small community, so unless we sell the water and save the money, we'll be in trouble when the pump breaks down." Awordo appears driven by hard lessons from past pump breakdowns and the resulting water shortages, and Afranse by a new awareness about the high cost of spare parts and the need to prepare proactively for future maintenance.

In three villages—Etsii Abeka, Ogoekrom and Eyiakrom—fees are not being collected regularly. Several reasons account for this phenomenon. Interviewees explained that designated collectors grow weary of negative attitudes and utterances during house calls (as in Etsii Abeka and Ogoekrom). Moreover, some residents consider the flat levy as unfair, complaining that larger households ought to

pay more than smaller ones. Furthermore, perceived lack of accountability discourages regular payment, as does widespread doubt about the reliability of the water facility as in the case of Eyiakrom.

Budukwaa had a very different reason for its failure to collect fees regularly. The leaders were sensitive to the financial difficulties faced by residents and relaxed rules to accommodate the situation. One village executive explained during interviews that they had temporarily suspended collection of levies due to widespread financial difficulties caused by poor harvest.

The financial management of the water facility in Eyiakrom is in marked contrast to its handling of the community health project, which has been in existence since 2003. The health committee has regularly restocked first-aid supplies all through this time.

4.2.2.3. Verification of savings account and money available when needed

Badukrom was the only community whose bankbook showed evidence of regular contributions, confirming that the money collected is duly being saved. Afranse keeps payment records and presented them on request, but showed no evidence of bank savings. Awordo could neither present its payment record nor bankbook, explaining that the person who kept them was not available. The designated collector in Eyiakrom reported receiving occasional payments from patrons, but was unable to show records to that effect.

I learned that study communities sometimes resort to one-time levying to raise contingency funds when faced with a broken handpump. Budukwaa and Awordo have both used this method in the past. However, the experiences of these two communities show that it takes time to raise the amount of money needed to buy hardware parts, leading to delays in repairs. This might explain why Awordo revised its financial policy to ensure prompt payment.

The level of financial commitment is an important indicator of the sustainability of the water facility, because it has a direct impact on a community's preparedness for inevitable pump breakdowns. It also reveals the extent to which residents are willing to cooperate with established rules for using the water facilities.

Table 4.9 presents the scores for each village and each variable in the financial management category. Table 4.10 is a summary of findings on the financial management of local projects, showing the total points scored by each community in this category.

Table 4.9. Scores for variables on financial management of local projects

(2 points possible for each benchmark)

Benchmark	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
Fee schedule is set (Water Fee Policy)	2	0	2	2	0	2	2	1
Fees are actually collected	2	0	2	2	0	2	0	1
Water fee records presented	2	0	0	2	0	0	0	1
Someone is employed/appointed to collect payments	2	0	2	2	0	0	0	0
Verification of savings account and money available when needed.	1	0	0	2	1	0	0	0
Able to present bankbook	0	0	0	2	0	2	0	0
Evidence of regular contributions to savings account	0	0	0	2	0	0	0	0
How much have they been saving?	0	0	0	2	0	0	0	0
Someone is employed/appointed to clean the water point facility	2	1	2	2	1	1	1	1
Accountability & Transparency	1	0	0	2	1	0	0	1
Totals	**12**	**1**	**8**	**20**	**3**	**7**	**3**	**5**

Table 4.10. Key findings on financial management of local projects (in order from highest score)

Village	Total Score	Rationale
Badukrom	20	Waters fees are charged at the water point. Residents pay by the bucket, and have access to the key should they need to fetch water during closure times. Badukrom was the only community that provided evidence of consistent, progressive savings. Their savings have grown from the opening balance of GHC30 ($15) in August 2009 to GHC296 ($146) at the time of the study. The last deposit was made in March 2013. Badukrom demonstrated financial commitment and transparency by instituting a strict payment regime and opening its bankbook for scrutiny.
Afranse	12	A fixed water fee has been set and water point payment instituted to ensure compliance (i.e. residents pay to fetch water). There are records showing that the water fees are actually collected. However, the community could not show the bankbook as proof of a savings account.
Awordo	8	In Awordo, the water project is the only one that requires financial management by residents. After the failure of monthly payment system, the community has now settled on a pay-per-bucket system, where each person pays 5 pesewas for each 18-liter bucket collected. To enforce this, the community has established lock times for both pumps, and employed two caretakers to collect payments and clean the facilities. However, repeated efforts to locate financial records of these payments proved futile. Instituting pay-per-bucket ensures residents pay for the water they do use. However, the absence of financial records raises questions about transparency and accountability.
Etsii Abeka	7	Household water levies are being collected. Records showed the last levies were collected on October 15, 2013 (a month before these interviews were conducted). Although respondents said the money was being taken to the bank, the bankbook showed no money has been deposited since the account was opened in February 2012: it only held the initial deposit of GHC20. Hence, there is no indication of where the money collected is being kept. Executives spoke about periodically rendering account to the community. While no one could recall the last time this was done, they admitted it had been over a month.
Ogoekrom	5	The community has instituted monthly water levies for women while men are expected to bring in contributions from paid labor. This system worked for a while but seemed to have collapsed at the time of this study. According to respondents, neither men nor women had honored their financial commitments for several months. It is worth noting that the woman in charge of collecting women's contribution has a list of defaulters and corresponding arrears. Plans are however underway to introduce monthly household levies. Once adopted, the handpump will be kept under lock and defaulters prevented from accessing it.

Table 4.10. Key findings on financial management of local projects (continued)

Village	Total Score	Rationale
Budukwaa	3	The community has instituted monthly household levies, but they have been temporarily suspended. According to one official who was interviewed, this was in sensitivity to difficult financial straits being faced by residents due to poor harvest. The community provided proof of bank savings, showing a balance of 54 GHC ($16). The bankbook showed that there had been three deposits into the community account, the initial GHC10 balance, and two further deposits of GHC20 and GHC24. The last deposit was made on November 7, 2012. It was apparent that the community had ill-prepared to address future pump breakdowns. However, they seemed to have solved past breakdowns through emergency fundraisers to pay for repairs. The community had also employed a nursery teacher for a year, until the government took over.
Eyiakrom	3	Since 2003, the community has sustained a healthcare program with an NGO called Hope for Future Leaders. As part of the program, one member of the health team stores first-aid supplies for the community. According to respondents, the first supplies were donated by the NGO, but subsequent restocking has been financed with proceeds from the sale of the first batch. Meanwhile, residents have refused to make any investment in the handpump because of the low yield. Although some people do fetch whatever little the handpump produces, the general view is that it is a waste to spend money on it. Occasionally, money is collected from residents who are observed fetching water, yet the record for these payments could not be verified. Respondents admitted that no money has been saved in the bank account since it was opened, and the bankbook was not available for inspection.
Atwereboanda	1	Residents lost interest in paying for the water when those in charge failed to render account after a year of selling the water. The last time residents contributed directly to the water project was in 2011, when they paid a one-time levy to finance repairs. Hence, no financial policy existed at the time of this study, though the village executives plan to have one in place soon.

4.2.3. Voluntary participation in community projects

This section discusses findings regarding the extent to which residents in study communities voluntarily participated in local initiatives. It examines the sense of ownership and responsibility exhibited by communities. In addition, it examines the perceived levels of social cohesion in project villages. Social cohesion can influence the performance of local projects, while decision-making patterns affect compliance with regulations. Decision-making patterns were also examined to determine the extent of community participation.

The variables included in voluntary participation are:

1. Participatory decision-making

2. Meeting times that are convenient and have strong participation by community

3. Sense of ownership toward local projects

4. Sense of responsibility toward local projects

5. Social cohesion

4.2.3.1. Participatory decision-making

Decision-making in study communities is usually by majority vote. Respondents in five study communities (Badukrom, Awordo, Afranse, Ogoekrom and Budukwaa) reported that rules and policies are extensively discussed at community meetings and adopted if supported by the majority. On the other hand, feedback from respondents in the other 3 villages (Eyiakrom, Etsii Abeka and Atwereboanda) indicated that decision-making is hierarchical; rules and policies are directives from village leaders (chief/regent, elders and village executives) that are communicated to residents at meetings.

4.2.3.2. Meeting times that are convenient and have strong participation by community

Community meetings are, by default, held on off-farm days (which are taboo days when farming is not allowed). They fall on Tuesdays in some villages and Thursdays in others. Respondents explained that meetings are usually announced ahead of time and residents are expected to make themselves available accordingly. A wide range of issues are usually discussed at these meetings, but occasionally special meetings are called to discuss specific issues such as water supply, fundraising, funeral arrangements and education. However, respondents in four communities intimated that meeting times, though announced ahead of time, are not always convenient for all residents. According to them, this especially affects women, as the timing often coincides with scheduled house chores such as cooking and cleaning.

I also found that those who find the timing inconvenient either arrive late at the meeting, or do not attend at all. Either way, this signifies that some residents are routinely excluded from meeting and thus lose opportunities to participate in potentially important deliberations and decisions.

4.2.3.3. Sense of ownership toward local projects

Study communities demonstrated varying degrees of sense of ownership toward local projects. For example, Afranse employed a caretaker and instituted restrictions to prevent misuse of its only functional water facility. Similarly, residents in Awordo took the initiative to repair their two handpumps when they both broke down. They learned lessons from the high cost of the repairs, and now the community keeps both pumps locked and has instituted a system of water point payment. They have also employed two caretakers (who are paid a third of all monthly proceeds) to collect the water fees and clean the pump area. In addition, they reconstituted the WATSAN and town committees to ensure improved performance (the second time in five years that it has been done). According to respondents, it became necessary to change members of the two committees because they were not performing their duties as expected.

Awordo has also shown a sense of ownership toward their school project. Residents were instrumental in establishing the community school. They raised money for cement to start the construction of the elementary school, and provided labor when the government stepped in to complete the project. Residents are also actively involved in the school's operations, and are active members of the school management committee. Their dedication to the school also had a positive effect on their water system; community leaders said that a clean water supply is essential for retaining teachers.

Residents in Badukrom also have a strong sense of ownership toward the water facility and their preschool project. According to the leaders, the community is committed to the smooth functioning of the water facility because the only alternative is the Ochi River, about two kilometers away. Badukrom's sense of ownership toward local projects is also evident in the support given to the construction of the preschool. Residents' contributions to the project included providing labor and meals for the workers. While the preschool was being built, a community member held classes for preschoolers outdoors under a tree. Children six years and older attend school in Atwereboanda, which is more than two kilometers away.

On the other hand, Ogoekrom, Eyiakrom and Etsii Abeka demonstrated a limited sense of ownership toward their local projects. For example, the chief and village executives in Atwereboanda appeared to be the only ones committed to sustaining the water facilities. According to the respondents, residents refused to attend a meeting called by the chief to discuss the outcome of a pump training program organized in October 2013 by NF/REDEP.

Likewise in Ogoekrom, the WATSAN committee members were intent on ensuring a sustainable water supply, but residents were not cooperative and stopped paying the water fees necessary to finance future pump repairs. Residents in Eyiakrom were supportive of the school and health projects, but do not have the same dedication to managing their water facility, because they do not believe it is worth the investment because of the low recharge rate.

4.2.3.4. Sense of responsibility toward local projects

I observed two ways by which communities exhibited their sense of responsibility toward local projects. In the first instance, the mechanisms to ensure efficient and thus responsible management of local projects is well established. An example of this is Badukrom, where the successful management approach used with the water facility has been transferred to the new preschool project. This made it possible for leaders to rally residents to assist with the work by assigning specific duties. For example, men helped with laying bricks while women fetched water and cooked the meals.

In the second instance, several communities acknowledged the need to adopt more responsible policies aimed at improving the performance of local projects, although such intentions were not always acted upon. Awordo and Afranse identified the need for more responsible management of their water facilities and actually followed through with it. However, Etsii Abeka, Ogoekrom, Budukwaa, and Eyiakrom admitted the need for similar changes, but are yet to implement any real improvements.

Respondents in Etsii Abeka explained that information gathered from the training workshop made the community realize the expense involved in replacing pump parts. This propelled the reintroduction of household water levies to ensure funds for future repairs. While the intention was laudable, it remains to

be implemented as residents have failed to pay the designated fees. Meanwhile, one of their two boreholes is rarely used because it is located in deep woods along an eroding, unlit path and is potentially unsafe for the women and children who fetch water.

In Ogoekrom, one woman who participated in the pump training workshop assumed the task of coordinating the cleaning of the pump area, and even mobilized residents to spread stones around the pump area to improve drainage. This is impressive considering that she is not a member of the actual WATSAN committee.

Eyiakrom's strong sense of responsibility toward its school project is seen in its successful efforts to establish a nursery, elementary and junior high school, and to lobby nonprofits to build teachers' housing. However, residents have refused to make any investment in the handpump because of the low water output. Although some people do fetch whatever little the well produces, the general view is that it is a waste to spend money on it.

Atwereboanda is on the other end of the spectrum; it has shown no sense of responsibility toward its local projects. Residents have ignored calls for healthier garbage disposal practices, opting for indiscriminate dumping instead. They also refused to attend a meeting to discuss potential improvements to the management of local projects. However, they do participate in joint cleaning exercises, but only because they wish to avoid the penalty for noncompliance.

4.2.3.5. Social cohesion

The term social cohesion translates into "*nkabom and korye"* in the local Fante language, which means "unity and oneness." Respondents were asked to state whether there was "unity and oneness" in their community, and to assign reasons for their answers. Generally, respondents associated cooperation and harmony with "unity and oneness." Hence residents' willingness to cooperate with rules and established policies is regarded as proof of "unity and oneness," whereas the refusal to do so, and challenging rules and established policies, are considered disruptive of unity within the community. Respondents' perceptions about community "unity and oneness" are further outlined in Table 4.11.

Table 4.11. Methods for determining social cohesion ("unity and oneness") based on findings

Community has "unity and oneness" because….	**Community has no "unity and oneness" because…**
Residents cooperate with rules and established policies such as payment of water fees, participate in cleaning exercises, attend meetings when called, and respect rules of water use.	Residents refuse to cooperate with rules and established policies.
Residents do not challenge the rules and established policies.	Some residents regularly challenge the rules and established policies, thereby creating dissent.

Afranse, Awordo, Badukrom, Budukwaa and Ogoekrom appeared to have the strongest social cohesion as evidenced by the high levels of compliance toward established rules and general agreement on alternative courses of action (as in the case of Budukwaa where water dues have been unanimously suspended). A level of dissent was evident in Etsii Abeka, where respondents complained about the lack of cooperation by residents in observing regulations. The leaders in Eyiakrom complained about a general lack of interest in paying for the use of the pump (explained above) and problems getting agreement on a new site for the community latrine.

Respondents in Eyiakrom also reported several instances of someone breaking the locks placed on the handpump in order to fetch water, although residents claimed they never used the pump because of the low water output. There were also complaints of rivalry between the WATSAN and health committees, which are sponsored by different NGOs.

Atwereboanda exhibited the lowest level of social cohesion, with many residents refusing to heed calls to properly dispose of garbage, pay water fees, and stop underage children from operating the water facility.

On the whole, communities with high levels of social cohesion were more likely to have effective water regulations. However, the ability to enforce such regulations appeared to depend on adopting strict methods such as water point collection of fees and closure times. It is interesting to note that even

communities with significant levels of cooperation ensured compliance through the adoption of such proactive measures.

Table 4.12 gives the assigned scores for each variable regarding voluntary participation in community projects, while Table 4.13 summarizes the key findings for this category.

Table 4.12. Scores for voluntary participation in community projects

(2 points possible for each benchmark)

Benchmark	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
Participatory decision-making	2	1	2	2	1	1	1	2
Meeting times that are convenient	2	1	2	2	1	1	1	2
Meeting times that have strong participation by community	2	1	2	2	1	1	1	2
Sense of ownership toward local projects	2	0	2	2	2	1	1	1
Sense of responsibility toward local projects	2	0	2	2	2	1	1	1
Social cohesion	2	0	2	2	2	1	2	2
Totals	**12**	**3**	**12**	**12**	**9**	**6**	**7**	**10**

Table 4.13. Key findings on voluntary participation in community projects (in order from highest score)

Village	Total Score	Rationale
Afranse	12	Chief, elders and village executives call community meetings when there are pending issues. Meetings are typically held on off-farm days, and all adult residents are expected to attend. Issues are discussed at length and decisions taken by consensus. Strong social cohesion evident in observance of rules concerning use of handpump. The community is determined to prevent further breakdowns of the only functioning handpump, and to eventually replace the one that is not repairable. To this end, residents have: a) Fired a former technician considered corrupt and incompetent in favor of a more reliable one. b) Introduced water point collection of user fees (pay by the bucket). Afranse has a community school that also serves neighboring villages. According to respondents, all school-aged children are enrolled, and parents are an active part of the school's support system.
Awordo	12	As mentioned, Awordo has a history of active involvement in the establishment and maintenance of the community school. Further evidence of widespread participation in community efforts include weekly joint cleaning exercises and sustained efforts in managing the water project.
Badukrom	12	According to respondents, meetings are held only when needed, and receive almost full participation by residents. All decisions are adopted at meetings after deliberations. Residents in Badukrom observe the rules governing the water facility, which is kept under lock. According to respondents, both male and female residents were actively involved in the preschool project, with men assisting in the actual construction and women supplying water and cooking for the workers.
Ogoekrom	10	Respondents indicated that the community is committed to maintaining its water facility, and are responsive to directives to that effect. However, residents have failed to adhere to the established payment policy.
Budukwaa	9	The village took the initiative to establish a kindergarten since the closest school is about 2.5 kilometers away. Past efforts at acquiring potable water and existing arrangements such as active WATSAN committee and stipulated household water levies point to positive attitude toward water facility. However, meeting times appear to have been arbitrarily established; one executive said once the call is made, residents are expected to stop all activities and heed the call. However, another respondent intimated that the meeting times are not always convenient for women. The village leadership showed sensitivity to financial difficulties faced by residents and temporarily halted payment of water levies. The truly participatory nature of meetings is dimmed by the fact that meeting schedules have been consistently inconvenient to half the village population, and that people are sometimes late to meetings and miss large parts of proceedings as a result.

Table 4.13 Key findings on voluntary participation in community projects (continued)

Village	Total Score	Rationale
Eyiakrom	7	Respondents conceded that residents are usually more cooperative with projects from which they see clear benefits, such as building a school block, participating in communal cleaning exercises, and volunteering for health and sanitation projects. Evidence suggests that residents are only supportive of projects they perceive as useful in the short-term. This attitude may have led them to overlook potential solutions to their water problem.
Etsii Abeka	6	Respondents spoke of the community's enthusiasm about the water facilities and ongoing support for the community school. Information from respondents indicated that the community has been diligent in repairing the facilities when they break down. However, one of the pumps is located deep in the woods, and the path leading to it is overgrown with weeds. Hence its location makes it potentially unsafe for the people who fetch water from there. The condition of the path and failure to promptly address calls to clean the facilities raises question about residents' sense of responsibility. Respondents said decisions concerning community issues are made in a participatory manner during meetings. Meetings are held only when there is an issue that needs to be addressed, such as when a handpump breaks down.
Atwereboanda	3	Residents readily respond to calls for communal work. Respondents indicated this was largely due to fear of being penalized. One respondent observed that residents were not in the habit of taking the initiative, but had to be prompted. The chief and village executives appear to be the only ones committed to sustaining the water facilities and residents refused to turn up for a meeting called by the chief to discuss outcomes of a pump training program organized in October 2013 by REDEP/Nyarkoa Foundation. One respondent spoke of community efforts in establishing a kindergarten.

4.2.4. Active role of women within the community

This section discusses findings about the role played by women in study communities. This variable was measured by three benchmarks: status of women in the community, level of women's participation in community efforts, and impact of technical training for pump maintenance. Each benchmark also had subcategories indicating its precise determinants as follows:

- Status of women in community, measured by women's influence in the community and their active participation in decision-making
- Level of women's participation in community efforts, as determined by women's involvement, contribution and acceptance of organizational responsibility.
- Impact of pump training, determined by women's increased involvement in community leadership.

4.2.4.1. Status of women in community

As stated, the status of women in the community was measured by the degree of influence held in the community, and the extent of their participation in decision-making.

4.2.4.1a. Women's influence in the community

Indicators of women's influence include whether women were counted among the "elders" in the community. Because elders comprise the governing council in rural communities (assisting the chief or regent in governance), being counted among community elders denotes high status and authority. As a result, the chief/regent's council of elders is customarily all male, and it is quite rare to find communities where women are included.

Three of the study communities—Awordo, Etsii Abeka and Badukrom—fall within this rare category, because women there either serve on the chief/regent's council of elders, or are leaders in their own right.

In Badukrom, women have significant power and influence. Since 2012, two women (aged 56 and 68) have been the de facto leaders in Badukrom. According to them, they were appointed village leaders after the death of the previous chief in that same year. Traditionally, the chieftaincy was supposed to pass on to his brother who resides outside the community. However, the brother recognized that the two women—also members of the ruling family—were more likely to be effective leaders due to their experience assisting the late chief in governance. Hence the two headwomen are in essence, regents. This is rare, because chiefs who opt to live outside their communities typically appoint male regents (as in the case of several of the study communities). These women therefore exercise all the authority a chief or regent would.

In Awordo there are women among the village leaders who play a central role in the community. For example, each of the five clans that rule the village has a queen mother who serves on the chief's council.

Another way women gain influence in a community is through membership on village committees. There are two types of committees in study communities. The first type is the Town Committee, which is dedicated to handling general community issues and serves as additional support to the traditional leadership (that is, the chief and the council of elders). Members are typically nominated by community elders (often with recommendation from other residents), and include people deemed responsible and trustworthy. Some individuals have also been known to volunteer to be members.

The second type of committee revolves around a mandate to manage a community project; in my study villages this is the Water and Sanitation (WATSAN) Committee. Members of this body can either be volunteers or nominees, but village leaders ultimately decide who serves on this committee. Communities themselves set up Town Committees, while the funding agency (either government of NGO) requires the establishment of the WATSAN committee as a precondition for a community's participation in the water project. The WATSAN committees are required to have women members, whereas town committees have no such requirements. It is not uncommon to find all male town committees and 11-member WATSAN committees with only two women.

All study villages have women serving on the WATSAN committees as required by the NF/REDEP program; five member committees have at least two or three women, while seven-member committees typically have three or four. However, not all women WATSAN members are active. The key WATSAN positions of chair and secretary usually go to men. Only one village—Eyiakrom—has a woman as chair of the WATSAN committee. The tendency to make men committee chairs stems from the cultural preference for male leaders. Also, since the work of the secretary involves record keeping, women in most study communities are automatically passed over for that position because they tend to be illiterate. Treasurers are often women, but their male counterparts often end up performing their designated duties of collecting water dues keeping records and taking money to the bank. On the other hand, positions for pump caretakers and hygiene educators tend to go to women.

Of the eight study communities, seven have town committees. Women have varying levels of representation in all but two communities. Badukrom has no formal town committee; instead, village elders assist the headwomen in directing affairs.

Table 4.14. Number of women on each committee in each village

	Town Committee			WATSAN Committee		
	Number of women on Committee	Total Committee Membership	% Women	Number of women on Committee	Total Committee Membership	% Women
Afranse	3	9	33%	2	7	29%
Atwereboanda	2	4	50%	2	3	67%
Awordo	3	11	27%	3	7	43%
Badukrom	2	3	67%	3	4	75%
Budukwaa	0	4	0%	3	5	60%
Etsii Abeka	0	5	0%	2	5	40%
Eyiakrom	3	4	75%	2	7	29%
Ogoekrom	3	7	43%	2	7	29%
Average	**2**	**5.9**	**34%**	**2.4**	**5.6**	**42%**

4.2.4.1b. Women's active participation in decision-making

I distinguish between two aspects of decision making within study communities: those pertaining to general community affairs, and those that relate to community projects. Within study communities, being an elder and/or a leader is one way that women are able to participate in making decisions pertaining to general community affairs. Another way is to reside in a relatively democratic community that practices participatory decision-making (discussed in Section C). Women who serve on the chief's council are in the former category. In the case of project related decisions, women who serve on the respective committees are automatic participants in making decisions concerning that particular project.

A clear example of this scenario is in Awordo, where women are actively involved in decision-making concerning water facilities and other community issues. This became particularly evident during my interview with the regent: when I requested to interview the officials in charge of the water project, he

told me that I needed to speak to the woman who was in charge of the Town committee. This elder turned out to be the deputy chair of the Town committee, who spearheaded efforts to improve the performance of the two water facilities and now serves as an advisor to the WATSAN committee. In addition, three of the 11-member village committee in Awordo are women, two of them serving in executive capacities as deputy chair and treasurer.

Beyond leadership and committee membership, the only opportunity available to women within a community depends on whether leaders are inclined to be democratic. In this study, this is manifested in the way rules are formulated. This process is described in detail in Section C above (Voluntary participation in community projects).

4.2.4.2. Level of women's participation in community efforts

As mentioned, this benchmark measured the level of women's involvement in local endeavors. It entailed determining what roles, if any, women played in pursuing community efforts, as well as the nature of their performance in designated roles.

4.2.4.2a. Women's involvement, contribution and acceptance of organizational responsibility

In this sense, women's participation was analyzed on two levels; the first examined whether there was any evidence of their participation in community efforts, while the second evaluated the outcome of that participation.

Within the study communities, opportunities for women's participation in community efforts typically exists in general participation in those efforts and/or being part of a Town or project committee. However, women who serve on committees obviously have more responsibility than those whose primary involvement hinges on complying with rules.

Determining the extent of women's contributions and acceptance of organizational responsibility is especially significant in two ways. First, it highlights that women have a sense of agency. Secondly, it has the potential to influence general community perceptions about women's capabilities. For example,

when the community members see a woman fixing a pump, the entire community begins to see women as more capable individuals.

Generally, women who have been given committee appointments proved diligent, to the extent that the local culture allowed them to be. I found out that this is the case whether they are members of the WATSAN committee or the Town committee. Women WATSAN members proved most effective as pump caretakers (cleaning coordinators) and hygiene educators. Their central role was to ensure the pump area is free of garbage, and that the health standards taught during training are upheld. As a measure of the extent of their dedication, most cleaning coordinators end up cleaning the pump areas themselves if designated cleaners fail to do their work.

Most communities seem to prefer women treasurers, but few of the treasurers I spoke to actually handled the money. The extent of their involvement in project finance is limited to accompanying their colleagues on house-to-house revenue collection. One exception was Badukrom, where the original WATSAN committee has been reduced to two (a woman and a men) after the death of two members and relocation of a third. There, one of the head women has assumed direct oversight of the pump; she collects the water fees, keeps the handpump under lock, and also keeps the bankbook.

Among women who had been given specific responsibilities, the most visible performers are the pump technicians. The extent of their involvement in community efforts is discussed under subsection D3 below.

The level of cooperation of women who had no committee or other leadership engagement generally mirrored community attitudes of either cooperation or noncompliance. Thus communities that reported high levels of noncompliance with rules generally had underlying problems of apathy and vice versa. Eyiakrom is the exception because the problem with low water output has generated apathy toward the water facility, although residents are responsive to other community projects.

4.2.4.3. Impact of pump training

This benchmark examines whether the technical training offered to selected residents had noticeable impacts in the respective communities.

Overview of the pump training program

The program implementers (NF/REDEP) decided to train local pump technicians to maintain and make minor pump repairs to help prevent the frequent major pump breakdowns. The decision to train women for this purpose was made for two reasons. First, the history of migratory patterns in rural communities—and the study villages in particular—showed that men were more likely than women to leave their villages for urban areas in search of work. This pattern is evident in all study villages, with the result that women and children form the majority of the population.

When the government first installed the handpumps (in the 1980s and 1990s), young men in many of these villages were trained in rudimentary maintenance and equipped with tools to perform necessary tasks. However, at the time of this study, none of the initial trainees still resided in their communities and the tools could not be accounted for. Given this history and the tendency for male migration, training local women instead of men appeared to be the best way to address the lack of local technicians. Considering the recommendations in the literature about encouraging a more meaningful women's participation in community development efforts, this study was an opportunity to evaluate a program that has actively adopted this approach.

The second reason for training women was to encourage their broader participation in managing the water facilities, particularly since they bear the burden when the pump breaks down and water is scarce. To this end, each community was asked to nominate two capable women to attend the training.

The decision to train women as pump caretakers was highly debated among the members of the NGO administering the program and the foundation funding it, primarily due to perceptions about women's capabilities. In fact, some members of the program implementation team were doubtful that women could actually be trained to do such a specialized job. They suggested it might be better to train

one man and one woman from each community so men could supervise the women in performing the work. The other implementers, including the engineer who oversees the pump installations and repairs, argued that women were as teachable as men and therefore capable of learning technical skills.

In the end, six of the villages in this study nominated two women each to attend the three-day training workshop, while the other two selected a man and a woman. The men were selected based on their history of active involvement in managing the water facilities in their respective communities. The training involved classroom instruction on the mechanisms of the four types of handpumps in use in the villages, and additional units on health and sanitation. Trainees were also given hands-on instruction in diagnosing problems and dismantling and reassembling the pumps.

Women's increased involvement in community affairs

This benchmark examines the specific ways that the pump training has heightened women's involvement in community affairs.

The training enhanced interest in managing the water facilities on the part of the women pump technicians. Prior to the training, the only channel for women to participate in water management was through membership on the WATSAN committee. However, the women from Afranse, Awordo, Budukwaa and Ogoekrom were not members of the WATSAN committee, but had volunteered to attend the training. After the training these women have taken active roles in managing all aspects of the water facilities. In Ogoekrom and Budukwaa, they demonstrated personal initiative, mobilizing residents to gather rock to stabilize an eroding pump platform and cleaning and painting a rusting pump.

Along with the pump technicians' increased involvement in management came a sense of personal responsibility toward the water facility. The women who I interviewed felt that they were given a mandate to ensure the successful operation of their water facilities, and were unwavering in their efforts to achieve this. This was especially evident in Eyiakrom, Ogoekrom and Atwereboanda. In Ogoekrom, the pump technicians were at the forefront of efforts to ensure the payment of water fees. In Eyiakrom, the two women faced stiff opposition from residents who claimed to have no interest in the handpump

due to its low yield, but fetched water when no one was looking. Yet the technicians, encouraged by the chief, were still committed to changing attitudes and making the best of the situation. And in Atwereboanda, the two technicians had the challenge of engaging a largely indifferent community.

Women's effective leadership

As the heading denotes, this benchmark examines whether women's leadership in study communities increased after the training. Part of the requirements of the training was that participants give a briefing to their respective communities on their return. One clear marker of leadership that I observed was that participants from all but one of the villages had successfully briefed their communities on what they learned at the workshop. I also learned that this briefing had significant outcomes. One such outcome is that communities were galvanized into saving money as a result of the information imparted by the technicians. The women were able to articulate the importance of saving money for future repairs and emphasized that it is imperative to improve the water management.

Both the technicians and the community leaders told me the information gathered from the training made them realize how expensive the pump parts were and brought home the need to save money toward future repairs. Three communities promptly started charging for the water after this realization. The others were in various stages of establishing financial policies at the time of this study.

Another indicator of women's increased leadership is that village leaders, both male and female, who were interviewed expressed confidence in the technicians ability to handle repairs. Some leaders believed there would no longer be the need to engage outside mechanics. Although the pump technicians were only taught how to handle minor repairs, the leaders' confidence in their abilities is a noteworthy shift in cultural notions about women.

Another leadership marker that I identified was that the women who had attended the training felt enlightened and confident that they could detect fraudulent claims by pump mechanics. Other respondents also regarded this newfound ability to discern bogus claims as especially beneficial, highlighting the fact that a number of rural communities had fallen prey to unscrupulous mechanics over the years. This has

resulted in several of them being misled into either paying for parts they never needed, or being charged for worn out parts passed off as new.

Significantly, the women who attended the training have become authority figures as far as the water facilities are concerned. Even younger women who would ordinarily have low status in the community (as a result of their age and gender) feel confident to address behavior that could adversely affect the water facility. For example, one eighteen-year-old said since the training, she has felt confident enough to ask people to stop littering the pump area when she sees them. She said she could not have done that were it not for the authority given her as a pump technician.

Residents in study communities generally recognize this authority, although responses vary by community. For example, the pump technicians in all study communities said they regularly called on residents to uphold established rules such as paying levies, cleaning the pump area, and banning under-aged children from operating the facilities. However, such promptings proved ineffective in Eyiakrom and Atwereboanda.

One striking outcome of the training program is that in some communities, the pump technicians are now in charge of handling issues pertaining to pump break down. While this was one of the training objectives, it is still significant in two ways: First, it fulfills the key requirement for women's active participation in water management by putting them in charge of maintenance. This is important, considering that frequent pump breakdown and subsequent delays in repairing the facilities have been a problem in a number of study communities. Therefore, being in charge of repairs places women in direct control over the performance of the facilities, which is noteworthy considering that in the past, handpumps had remained broken for extended periods of time due to delays in contacting technicians.

Secondly, it implies confidence of the caretakers' competence on the part of the community leaders and residents. This sense of confidence was evident even in communities where women did not have much influence. For example, one leader conceded women were not numbered among the "opinion

leaders" in the community, yet went on to describe what amounted to significant responsibilities held by specific women in the village:

> We've appointed women to committees like WATSAN and the health team. As for those in charge [of those committees/teams], it's men...The fact is that right now, we praise the women more than the men. Take for example the KVIP [latrine] under construction; it's the women who fetch water everyday. The men also fetch, but the women are more consistent… Anytime you call on them, they'll respond. *(Man, 76)*

Table 4.15 summarizes results on the role of women in study communities.

Table 4.15. Scores for the role of women in study communities
(2 points possible for each benchmark)

Benchmark	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
Women's influence in the community	1	1	2	2	1	1	1	2
Women's active participation in decision-making	1	1	2	2	1	1	1	1
Level of women's participation in community efforts (women's involvement, contribution and acceptance of organizational responsibility)	2	2	2	2	2	2	2	2
Impact of pump training	2	1	2	2	2	**1**	**1**	2
Totals	**6**	**5**	**8**	**8**	**6**	**5**	**5**	**7**

As Tables 4.15 and 4.16 (below) indicate, only two communities—Badukrom and Awordo—scored high on all four variables. In Ogoekrom, Afranse and Budukwaa, women were active participants in community efforts, and the pump training showed visible impacts, yet women did not have decision-making power. In Eyiakrom, Etsii Abeka and Atwereboanda, women were strong participants in community projects, yet had no decision-making power and were only minimally able to engender change from lessons learned at the training due to residents' apathy; women in Eyiakrom women had to contend

with residents disillusioned by the persistent low water yield of the handpump and therefore non-cooperative. In Atwereboanda, where residents are largely apathetic, there was little the technicians could do besides try to apply constant pressure.

What I learned was that women's status within study communities is indeed a mixed bag, which could best be summarized as follows:

- Committee membership does not imply authority.
- Leadership is largely considered male prerogative, except when thrust on women by circumstances.
- Although women in all study communities participated in training, impacts varied in effectiveness.
- The pump training is the most consistent enhancer of women's leadership in study communities. It requires duties beyond committee representation and makes them more visible, even when their efforts do not always yield immediate results.

Table 4.16. Key findings on the role of women in study communities (in order by highest score)

Village	Scores	Rationale
Afranse	6	There are three women on the nine-member village committee, though none hold executive positions. Three women serve on the WATSAN committee, along with four men (two of whom have passed away). Only one of the women holds an executive position as a treasurer. However, she does not actually handle any financial issues. The two women who participated in the training program are in charge of contacting technicians when faults develop.
Awordo	8	Three out of the eleven members of the newly constituted village committee are women. Two of them serve in executive capacities as deputy chair and treasurer. Both caretakers employed to collect money and clean the pump area are women (one the pump caretakers was among the trained pump technicians).
Badukrom	8	Two headwomen are in charge of the day-to-day village administration. One of them has direct oversight over the pump; she collects the water fees, keeps the handpump under lock, and also keeps the bankbook. It is worth noting that the headwomen not only provide leadership for the community, but have also broadened their influence into effectively managing the water facility.
Ogoekrom	7	The women who participated in the pump training workshop have taken up the task of coordinating the cleaning of the pump area. One of them even mobilized residents to spread stones around the pump area to improve drainage after spills. This is impressive considering that she was not a member of the initial WATSAN committee. Respondents expressed confidence in the ability of the trainees to repair the pump when the need arises. Although the trainees may not be able to perform anything more than minor maintenance, this reflects a shift in traditional attitudes toward women. The trainees are also at the forefront of efforts aimed at enforcing established water use regulations and brainstorming ways to enhance maintenance of the water facility.
Budukwaa	6	Women appear to have limited power and influence in the wider community. The members of the 4-member Town committee are all men. However, three out of the 5-member WATSAN committee are women, and are more active than the men. One respondent believes the absence of women on the Town committee reflects the belief in its leadership that "women are of no consequence." She said she had a lot to contribute if she were a member. The level of women's involvement in the community could be improved. Findings showed that women are not consulted in key decision-making. However, the few women in leadership positions on the water project have proved resourceful.
Atwereboanda	5	The two women on the WATSAN committee—who also happen to be the pump technicians—are the most active when it comes to water issues and enforcing environmental cleanliness. They have been working with village executives to encourage a more responsible management of the water facility.
Etsii Abeka	5	There are two women serving on the WATSAN committee, one in an executive capacity. Investigations revealed that there are only two influential women in the community, the queen mother and the WATSAN treasurer (who also attended the training workshop). The queen mother has the traditional mandate to ensure women fulfill their customary obligations, while the WATSAN member has been put into a non-traditional leadership position normally reserved for men. Her status puts her at the helm of decision-making concerning the management of the water facilities. Traditional gender roles are observed in assigning duties: Women are responsible for cleaning the community at least weekly, and the pump area daily. Men are only required to clear overgrown bushes. Also, there are no women on the town committee, although the queen mother considers herself an elder in the community. Adherence to traditional gender roles means that men make major decisions in the community, and it is clear that more women need be admitted into the leadership team. However, the queen mother and the female WATSAN official appear to have gained a foothold into the leadership circle of the community. Nonetheless, the queen mother's mandate appears constrained, because her duties entail maintaining the status quo. On the other hand, the treasurer keeps the bankbook and also accompanies her colleagues to collect household water levies.
Eyiakrom	5	A woman chairs the WATSAN committee. She is one of two women pump technicians. Although there is a third WATSAN member (male), these two women are the most active. A number of women are also serving as volunteers in the other community projects. It is interesting to note that one respondent acknowledged the remarkable contribution of women to community projects, but did not recognize them as "opinion leaders." Although women are not officially considered leaders, the two WATSAN women in Eyiakrom have exhibited clear leadership in their handling of the water situation. It is through their diligence and collaboration with the chief that the water facility still stands, despite neglect from the rest of the community.

4.2.5. Widespread understanding of the benefits of clean water

This section discusses the extent to which study communities perceive the importance of a water facility, and examines how this perception influences the management of their water facilities. To determine this, I measured:

1. The extent to which the facility is being used
2. Knowledge of health importance of using clean water
3. Level of support for charging for water
4. Perceptions of reliability of water facility
5. Attitudes toward location of water facility

4.2.5.1. To what extent is the facility being used?

To determine the extent to which each water facility is being used, I examined whether residents use it exclusively or alongside traditional sources (rivers and/or lakes, seasonal ponds and open wells). I found out that only three communities (Badukrom, Ogoekrom and Etsii Abeka) use their water facilities exclusively. The rest use traditional water sources at various times. For example, residents in Budukwaa use an open well during the rainy season, but rely exclusively on the handpump during the dry season. Residents in Awordo, Afranse, Eyiakrom, and Atwereboanda are able to access streams year round, and thus use those alongside the handpumps.

Convenient access to alternative water sources influences whether the water facility is exclusively utilized or not. Thus for Badukrom, Ogoekrom and Etsii Abeka, the most convenient water source is the handpump, and is their only convenient source of water supply other than collecting rainwater. In fact, some residents in all the communities collect rainwater during the rainy season.

Other factors besides the availability of convenient alternatives also influence usage patterns. These include the location of the water facility, traditional beliefs, habit, and taste preference (attitudes about the location of the water facility will be discussed shortly).

Within the traditional African worldview, gods are believed to reside in water bodies. Some residents in study communities expressed the belief that siting a handpump close to a river offends the river gods, who then cast a spell on the handpump and cause it to break down frequently. To avoid offending the gods therefore, they believe that it is important that community residents do not completely stop using the river.

The most common reason given for continued use of the river even when a handpump is available is that is difficult to switch from years of using the river to the handpump. In particular, residents cite a poor "salty" taste of the water and its inability to produce lather for laundry as the reasons why they continue use the river alongside the handpumps. It is worth noting that there is no salt in the well water; rather the taste comes from minerals picked up from the soil.

4.2.5.2. Attitudes toward location of water facility

According to respondents, the engineers responsible for drilling the wells in each village largely decided their locations. Support for the location of the water facilities varies from one village to another, and also within villages. It turned out that often the drillers' choice of site was not necessarily the best and most convenient for the residents. For example, the residents of Atwereboanda complain that the site of one pump gets marshy when it rains, and makes it difficult to access the facility, The site at Eyiakrom was poorly chosen and it might have been expected that the well would not produce much water. In addition, it is located on a steep slope that many find too rugged to walk on while carrying a load.

Only four communities (Badukrom, Awordo, Ogoekrom and Budukwaa) said they are fully satisfied with the location of their water facilities. Two communities (Afranse and Etsii Abeka, who each have two handpumps) said they are satisfied with the location of one of the facilities, but not the other. Table 4.17 outlines attitudes toward the location of water facilities, and the rationale behind those attitudes.

Table 4.17. Rationale for attitudes toward location of water facilities in study communities

Village	Attitude toward location of water facility	Alternative water source(s)	Which is considered more convenient?
Afranse	Supportive of the location of both facilities, since each serves a section of the population. Still, there are some residents who believe the second well is too close to the Ochi River and the spirit of the river is responsible for the repeated breakdowns of that facility.	Ochi River	Ochi River or handpump, depending on residence.
Atwereboanda	Not supportive of location as the area is marshy	Ochi River	Ochi River
Awordo	Supportive; both handpumps are in locations that are convenient to residents.	Ochi River	Water facility or Ochi River, depending on residence
Badukrom	Supportive; residents were understand that the current location is the best that could be identified.	No real alternatives. Ochi River is about two kilometers from the village	Handpump
Budukwaa	Supportive; residents understand that the current location is the best that could be identified.	Seasonal pond and two open wells that only fill in the rainy season.	Handpump
Etsii Abeka	Supportive of the facility closer to town, but wish the second were closer to homes. This may explain reluctance to keep the area clean (second well located in the woods is low priority)	Ochi River; located 1.6 kilometers away.	Handpump
Eyiakrom	Not supportive of location; some blame the water problems on the decision to locate the facility uphill from a stream whose god, they believe, is resentful for being ignored.	Stream, open well, and handpump in neighboring village	Stream, open well, and handpump in neighboring village
Ogoekrom	Supportive of the location as residents understand it was the best one identified by the installation team.	No real alternatives; the Ochi River is about three kilometers away from the village	Handpump

In all communities, residents who regard the location of the facilities as "too far" from their homes or inconvenient to access turn to more convenient alternatives where available. Generally, communities that reported being fully satisfied with the location of the facility have no real problems accessing it. They recognize that it might be inconvenient to some residents, but the general view is that it is the best available option. Locations that are difficult to access tend to discourage exclusive usage which, when combined with habit and preference, presents a strong incentive to going back to traditional water sources.

4.2.5.3. Knowledge of health importance of using clean water

Residents in study communities readily associate handpumps with clean, healthy water. Having participated in a number of health and hygiene education seminars since the installation of the water

facilities, they are knowledgeable about the health benefits of using water from the facilities, as well as the health risks of patronizing traditional water sources (streams, ponds and open wells). Interview responses reflected this knowledge, with respondents identifying the eradication of guinea worm, cholera and bilharzia (also known as schistosomiasis) as the greatest health gains of having clean water.

In addressing knowledge about health importance of using clean water, I also examined the impact of this knowledge on behavior. Hence, I analyzed not just awareness, but also whether this awareness has had any impact on behavior, as in using the water facility instead of traditional sources, as well as reasons for using one source or the other.

Findings showed that while awareness of health benefits might be important, the ultimate motivation for exclusive usage and successful management of a water facility are convenience and individual preferences. The problem at Eyiakrom is an example. The government drilled a well and installed a handpump in Eyiakrom after residents had appealed for such a facility for years. After the installation however, it quickly became apparent that the well had a low yield. Following numerous attempts to improve water supply, the well continues to produce much less water than required by the community of over 300 people. For the people of Eyiakrom therefore, the handpump does present a healthier alternative to the stream (that happens to be a quarter of a mile down a steep hill from the well), yet it is not a convenient water source. Residents currently fetch water from an open well, the stream and a handpump in a neighboring village.

4.2.5.4. Level of support for charging for water

Some community residents are philosophically opposed to buying water. They feel it should be a basic right, even though it costs a lot of money to construct and maintain a water facility. Having money available to promptly perform needed repairs provides a better chance of having an uninterrupted water supply.

The clearest indicator of the level of support for charging for water is the presence of a financial policy. This is because establishing a financial policy demonstrates that the community has analyzed its water situation and determined that is an effective way of ensuring long-term success of its facility.

As discussed under section B of this chapter, all communities except one (Atwereboanda) had a financial policy at the time of the study, albeit at varying levels of implementation. The challenges of implementation notwithstanding, the presence of a financial policy is an important step toward ensuring a sustainable water facility.

4.2.5.5. Perceptions of reliability of water facility

Respondents in all villages, except Eyiakrom, said they were confident that their water facilities could provide them with reliable water supply for the long-term. In Eyiakrom, the unreliable nature of the water facility is obvious to everyone, and has resulted in a marked opposition to any measures aimed at managing it.

Examining people's perceptions of the importance of clean water therefore revealed that although the handpumps are generally viewed as a healthy alternative to other sources, if it is not considered convenient or the water has a poor taste, some people lose interest in using it.

Individual preferences about the taste of the water also influence the extent of usage. Hence, although aware that unprotected water sources like streams and open wells harbor disease agents, some residents in four of the study communities (Afranse, Awordo, Atwereboanda and Budukwaa) prefer to use water from such sources because those "taste better than the pump." On the other hand, residents in Badukrom, Etsii Abeka and Ogoekrom use their water facilities exclusively, regardless of the taste, as there are no convenient alternatives.

Table 4.18 provides details on the scores for widespread understanding of the benefits of a water facility, while Table 4.19 is a summary of key findings on widespread understanding of the benefits of a water facility.

Table 4.18. Scores for widespread understanding of the benefits of a water facility (2 points possible for each benchmark)

Benchmark	Afranse	Atwereboanda	Awordo	Badukrom	Budukwaa	Etsii Abeka	Eyiakrom	Ogoekrom
To what extent is the facility being used?	0	0	0	2	0	2	0	2
Knowledge of health importance of using clean water	2	2	2	2	2	2	2	2
Level of support for charging for water	2	0	2	2	2	2	2	2
Perceptions of reliability of water facility	2	1	2	2	2	2	0	2
Attitude toward location of water facility	1	0	2	2	2	1	0	2
Total	**7**	**3**	**8**	**10**	**8**	**9**	**4**	**10**

Table 4.19. Key findings on widespread understanding of the benefits of a water facility (in order from highest)

Village	Scores	Rationale
Badukrom	10	Residents in Badukrom appreciate the convenience and health benefits of the water facility. According to the leaders, the community is ever mindful that failure to maintain it would lead to serious water shortages, and are therefore dedicated to its maintenance.
Ogoekrom	10	According to the leadership, the community considers the water facility important because the only alternative water sources are a stream that is too far away for convenient access, and a shallow well. Both these source are understood to be unsafe for consumption. Residents further recalled that the introduction of the handpump led to the eradication of guinea worm, which had been endemic in the village.
Etsii Abeka	9	Respondents spoke about the eradication of guinea worm, cholera and bilharzia since clean water from a pump was introduced into the community. According to respondents, residents' initial reluctance to use the handpumps quickly faded once they came to appreciate their convenience and health benefits, and they remain the sole water source being utilized. Residents are assured of the capacity of the wells to meet their water needs for the long term.
Awordo	8	Residents generally understand that safe water provides protection against water-borne diseases, but some people still patronize the stream for various reasons.
Budukwaa	8	According to respondents, the community considers the water facility to be essential because it solved their chronic water problems and put an end to guinea worm infection. However, some residents complain about the poor taste of the water, and said they fetch water from the open well in the village whenever it is available. Hence although there is a consensus that the water facility offers the most stable, healthy and convenient water supply, residents only fully utilized it during the dry season.
Afranse	7	Despite widespread awareness of the health risks of using unprotected water, respondents admitted that some residents used the stream along with the pump. While one reason could be preference, it is also possible that the stream is more easily accessible to those living in the southern part of the village, where the frequently broken pump is located. That may change when the pump is finally repaired or replaced.
Eyiakrom	4	Respondents recognize the importance of clean water, but the low yield from their well has removed interest in maintaining it. Current water supply for residents comes from seasonal rains, an open well, a stream within the village, and a handpump in a neighboring village. Some people also purchase bagged purified water for drinking. Thus awareness that water from open wells and streams harbor diseases has not stopped residents from accessing these sources when convenient.
Atwereboanda	3	Findings showed that only a small segment of the community truly appreciates the benefits of a clean water facility, and the majority still patronize the stream. The two WATSAN committee members are certainly aware of the benefits and are doing their best to encourage the people to use clean water.

Another interesting finding was that some residents who disliked the taste of the water from the handpumps purchased purified water for drinking, rather than going to the stream or open well. This showed that people with a deep understanding of the importance of clean water, and the means to find a "tastier" and equally healthy alternative to the pump, are willing to spend extra money to do so.

4.3. Comparison Across Villages

The performance of the water facilities and local projects clearly vary between villages. In this section, I look more closely at project performance across villages to identify specific characteristics that contribute to the overall status of the respective community water facilities and projects. Table 4.20 is a summary of village-specific scores with respect to characteristics and benchmarks.

Table 4.20. Summary of scores for each variable

	A. Demonstrated ability to manage local projects	B. Financial management of local projects	C. Voluntary participation in community projects	D. Role of women within the community	E. Widespread understanding of the benefits of a water facility	**Totals**
Badukrom	18	20	12	8	10	**68**
Awordo	18	8	12	8	8	**54**
Afranse	16	12	12	6	7	**53**
Ogoekrom	16	5	10	7	10	**48**
Budukwaa	16	3	9	6	8	**42**
Etsii Abeka	10	7	6	5	9	**37**
Eyiakrom	16	3	7	5	4	**35**
Atwereboanda	5	1	3	5	3	**17**

Badukrom scored the highest, with 68 points out of 68 points possible, while Atwereboanda scored lowest at 17. These results are not so surprising, considering the circumstances already discussed under the various variables above. The widest differences between villages are seen in the financial management of local projects. For example, village scores under "Demonstrated ability to manage local projects" are fairly close. With the exception of Atwereboanda, all study communities have similar results in the subcategories addressing monitoring, provisions for technical support, role of leadership in local project, predictability, and responsiveness.

In comparing village performance, one key finding was that evidence of financial management has a crucial effect on the long-term conditions of water facilities. Thus although Awordo, Badukrom and Afranse all have top points for having an established, well-enforced financial policy, Badukrom earns the maximum total score for financial management. This is because it was able to show proof of financial preparedness in the form of a bankbook that reflected regular savings deposits. Aside from establishing a well-enforced water fee policy, Awordo demonstrated no evidence of being in a position to address inevitable pump breakdowns.

I observed that communities that lacked evidence of financial savings also scored poorly on transparency and accountability. These combine to create a bleak future for the sustainability of local projects like the water facility that require money to solve crises like pump breakdowns. This is because residents in communities with no financial accountability and transparency are less likely to pay established fees.

Women in Badukrom and Awordo—the two highest scoring communities—also had the strongest roles within their communities. These two villages, along with Afranse, also had the highest level of voluntary participation in local projects. These findings are significant, and reveal a link between active participation of women in community affairs and the positive performance of local projects.

CHAPTER 5: CONCLUSION

5.1 Aims of the Research

The purpose of this study was to identify community characteristics that lead to the successful outcome of rural water projects. I postulated that potentially successful project villages possess certain characteristics, which include the following:

- Demonstrated ability to manage local projects.
- Financial management of local projects.
- Voluntary participation in community projects.
- Active role of women within the community.
- Widespread understanding of the benefits of clean water.

Using the above-listed characteristics as study variables, I have demonstrated through data from interviews, participant observation and analysis of records, how each variable shapes outcomes of water projects in the eight study communities.

5.2 Key Findings

The key finding of this study is that the variables are interconnected and complementary. Ultimately, financial management and the availability of funds to repair the handpump determines whether a community will have uninterrupted water supply or revert to unprotected sources when pumps break down. However, that level of financial preparedness is not attainable without a strong foundation in all the other variable categories. . For example, the village with the most successful water project (Badukrom) exhibited the following characteristics:

- A well-enforced set of regulations governing the use of the water facility (demonstrated ability to manage local projects);

- Consistent collection of water use fees and evidence that the money collected is held in the community's bank account (financial management of local projects);
- Residents with a proven sense of voluntarism for community endeavors (voluntary participation in community projects);
- Women who actively participate in managing both the community and the water facility (role of women within the community);
- Residents who appreciated the convenience and health benefits of clean water and were committed to preserving the water facility (widespread understanding of the benefits of a water facility);
- A hand pump that, with proper maintenance and prompt repair, been in operation for 31 (sustainability of water facility).

This demonstrates that the right combination of factors enhances the sustainability of community water facilities. For instance, it takes efficient leadership to formulate and implement effective rules; an engaged, responsible citizenry who appreciate the importance of clean water to ensure compliance; strong financial commitment to afford the cost of routine maintenance, and active women's participation in managing the facility to ensure that the group with the highest stake has direct control on its maintenance.

Another finding—which confirms evidence from the common property literature—was that confidence in the resource does play a critical role in residents' attitude toward the water facility (see Agrawal, 2001, 2003; Agrawal & Benson, 2011; Esrey et al., 1991; Ostrom, 2009). This was especially evident in Eyiakrom, which had strong leadership, well-established rules, active participation by women, and effective financial management on other existing community projects—but not on the water facility—because the well had a very low recharge rate. Without strong confidence in the facility, they were not willing to invest time and money into it.

The importance of women's active participation in community affairs in general, and in the management of water facilities in particular, was another significant finding. While the literature recommends active involvement of women in planning, implementing and managing projects,

programs that seek to act on such recommendations have typically adopted the "administrative" approach. This approach entails encouraging women's membership in water management committees in a marked departure from norms where such committees are usually comprised of men. At first glance, this approach seems to be the logical solution to the problem of women's exclusion in community water management. However, evidence has shown that representation is often nominal (Sam, 2011; Opare, 2005; Braimoh et al., 2004; Regmi & Fawcett, 1999). Hence, what was meant to be a gender-sensitive committee of peers becomes instead a platform for reinforcing men's leadership and women's subordination.

Given the limitations of seeking active participation by women in community water management, another alternative (adopted in only a handful of communities across the world thus far) is to give women the technical skills to maintain the facilities (practical/technical approach).

Based on my observations, the administrative and practical/technical approaches differ from each other in many respects. These are described in Table 5.1.

Table 5.1. Comparison of two types of women's participation in community development projects

Administrative (WATSAN membership)	**Practical/technical (Training pump technicians)**
• Fosters passive involvement due to the nature of mandate/expectation: attend meetings; collect money; clean pump area. • The only active work is designed for pump caretakers (who invariably end up cleaning the pumps instead of mobilizing residents to do so), and the hygiene educators, whose duty is to give ongoing health and hygiene education to residents, yet they rarely get the opportunity to do so.	• Requires physical involvement; replacing parts, tightening bolts (more hands on). By its nature, it enables women to transcend traditional roles and venture into hitherto designated male domains, • Boosts women's confidence to be trusted to do something one was previously deemed incompetent to do.

I found the pump training program gave women a level of recognition and authority that superseded traditional gender constraints. Their mandate is to ensure successful management of the community water facilities. Therefore, they enforce the rules of use on everyone, including men. This is revolutionary in a male-dominated culture where men are more accustomed to giving instructions to women than vice-versa.

What is more, women who were part of the original WATSAN committees have become more actively involved in managing the water facilities and those who had not been part of the original committees developed newfound interest in the facilities and are taking initiatives to ensure its success. It is worth investigating whether this influence also extends to other aspects of community management.

This study also confirmed that effective monitoring is essential to the success of rural water projects. The two types of monitoring identified in study communities—internal and external—have proven invaluable in diagnosing challenges and addressing problems at an early stage.

5.3 The Significance of the Research

This study provides helps to answer the quest for sustainable management of rural water facilities. It represents the first known attempt to directly apply the design principles noted for influencing the performance of common pool resources in measuring the performance of small scale rural water facilities (see, for example, Ostrom, 2009; Iza & Stein, 2009; Garande & Dagg, 2005; Anderies et al., 2004; Meinzen-Dick et al., 2004; Doe & Khan, 2004). As is the case with any socio-ecological system, my findings show that the success of rural water facilities hinges on identifying and addressing its various facets in concert.

Most significantly, this study demonstrates that the infrastructural and institutional aspects of rural water supply should not be considered in isolation, but rather treated as composite parts of the same issue. Thus institutional arrangements (establishing strong, enforceable user rules that include honoring financial commitments) facilitate the smooth functioning of the community water facilities. Similarly, it calls for greater understanding of socio-cultural settings of development programs, considering that social nuances influence the establishment and implementation of rules governing the water facilities.

Findings about the impact of the regular monitoring by the implementers of the water program reveal the importance of community access to timely technical support. They also demonstrate that accountability to external support organizations promotes improvements in managing the water facilities.

The results of this study provide a model for communities and development practitioners to identify critical variables for sustainable rural water supply. These variables, outlined in Table 1.1, are a useful checklist to help determine a community's level of preparedness to manage a water facility, and to offer a target for capacity building in communities that may have shortcomings with respect to the identified variables.

5.4 Implications of Findings

This study addresses gaps in research within the rural water supply sector. Earlier studies have evaluated rural water projects by looking at how individual factors including user participation and community ownership affect their performance. Others have examined how community water projects benefit women, and have recommended women's involvement as a way to enhance sustainability (see; Montgomery et al., 2009; Ivens, 2008; Fraser et al., 2006; Gender and Water Alliance 2006a, 2006b; Rogers & Hall, 2003; Carter et al., 1999; Wakeman et al., 1996). However, none of these studies addressed the actual impacts of women's long-term participation in managing community water projects.

The findings of this study demonstrate that a successful community water project is not the result of any single variable. Rather, it requires a combination of strong leadership and organization, financial commitment, active women's participation, and confidence in the water resource.

In applying Ostrom's principles of common property resource management to rural water supply programs, I aimed to call attention to the fact that communities do have a responsibility toward their water facilities, given that the water facilities are really just common property resources. Thus, blaming external agencies and factors for the high rates of handpump problems fails to take into account the local factors that cause pumps to break down.

Ostrom's work drew attention to the fact that privatization and government control are not the only options for successful management of shared resources, and this study's findings demonstrate that efficient collective action does promote responsible management of rural water facilities. This is significant, because it highlights the fact that local communities have the capacity to influence their

own destinies. If development programs have the dual intent of improving the quality of life and empowering local communities to take charge of their own destinies (Ajayi & Otuya, 2006; Lucas, 2001), then personal agency (an individual's capacity to influence and determine his/her life condition) is vital to promote local ownership of the development process and bring about empowerment (Cleaver, 2007; Sen, 2000; Wetmore & Theron, 1998). Admittedly, this calls for a paradigm shift from perceiving local communities as recipients of development assistance to recognizing them as possessing a sense of agency and control over the outcomes of community development projects.

As the findings on monitoring demonstrate, one optimal condition for a successful rural water project is a strong partnership between external support agencies and local communities so they can receive timely technical support. However, it is imperative that the user community takes charge of managing its facility, in order to reflect local norms and preferences. Handpumps, like all mechanical devices, are prone to breakdowns if not properly maintained. While communities may not have the expertise to service the handpumps, they do have the capacity to engage the services of an expert when repairs are needed. Whether or not a community receives the needed technical help depends on its level of preparedness as revealed in how they rank on the critical variables

The findings further reinforce earlier assertions made by experts on women's rights and rural development that women's active participation is an essential component in promoting rural water sustainability. In particular, it shows that giving women technical skills to maintain their community water facilities is not only the most practical means of ensuring sustainability, but also provides additional benefits for women's empowerment.

Notwithstanding the traditional tendency to exclude women from leadership and decision-making, findings from this study have shown that some women do attain leadership positions and gain a measure of authority in their communities. The women who lead Badukrom are prime examples. However, in the end, the status of women in these communities is not unlike that of women the world over, who have to contend with cultural limitations, but still manage to break out of the mold. As demonstrated by the inroads made by educated women in Ghana, Rwanda, the United States and other countries, traditional labels do not define

women's abilities. It takes the practical realization that women, like all human beings, have potentials that can be harnessed, to disprove stereotypical notions of women's inherent limitations. An example can be seen in the way traditional leaders in the study communities not only welcomed the idea of training women, but are also confident in their abilities to apply their training.

This decision to train women as pump technicians was not directed at forcing cultural change; it simply provided a practical opportunity for communities to engage women in a non-traditional role. The proposal to do that was put before the leaders and residents of the communities, who agreed it was a good way to address the problem of intermittent pump breakdowns. Training women as technicians was not meant to be a political statement, but whatever positive impact it has on women's empowerment is welcome. In fact, in their frequent visits to the villages by NF/REDEP, personnel have not detected complaints that women are usurping authority. Rather, it appears that residents recognize that the trained women have gained important skills and knowledge that are beneficial to the community.

Finally, the findings demonstrate that the search for sustainable rural water supply should be guided by a multidimensional approach.

5.5 Recommendations for Future Research

This is an exploratory study geared toward refining the hypothesis of what determines the sustainability of rural water facilities, so that future studies can provide more evidence. Further research is required to determine the most effective strategy for promoting women's active participation in community water management. Currently, the prevailing viewpoint emphasizes giving them decision-making power, yet the difficulties involved in ensuring true participation through this means raises questions about its effectiveness as a tool.

In addition, a long-term study is needed to determine the extent to which training women as pump technicians impacts the performance of rural water facilities. This knowledge is essential because giving women the technical capability to maintain handpumps simultaneously addresses two variables identified as being critical to sustainable rural water supply and rural development: namely, direct stakeholder involvement (given women's primary responsibility for domestic water supply) and

promoting inclusiveness in community projects (See Fraser et al., 2006; Rogers & Hall, 2003; Thomas, 2002; Lucas, 2001; Wetmore & Theron, 1998; Bamberger, 1988).

LITERATURE CITED

Abrams, L., Palmer, I., & Hart, T. (2003). *Sustainability management guidelines for water supply in developing communities.* Department of Water Affairs and Forestry, South Africa.

Abrams, R., Anwana, E. D., Ormsby, A., Dovie, D. B., Ajagbe, A., & Abrams, A. (2009). Integrating top-down with bottom-up conservation policy in Africa. *Conservation Biology*, 23(4), 799-804.

Acharya, S., Yoshino, E., Jimba, M., & Wakai, S. (2007). Empowering rural women through a community development approach in Nepal. *Community Development, 42*(1), 34-46.

Agarwal, B. (2002). *Gender inequality, cooperation and environmental sustainability*. Paper presented at the workshop on Inequality, Collective Action and Environmental Sustainability, Santa Fe Institute.

Agrawal, A. (2001). Common property institutions and sustainable governance of resources. *World Development, 29*(10), 1649-1672.

Agrawal, A. (2003). Sustainable governance of common-pool resources: Context, methods, and politics. *Annual Review of Anthropology*, 243-262.

Agrawal, A., & Benson, C. S. (2011). Common property theory and resource governance institutions: Strengthening explanations of multiple outcomes. *Environmental Conservation, 38*(2), 199-210.

Ajayi, R., & Otuya, N. (2006). Women's participation in self-help community development projects in Ndokwa Agricultural Zone of Delta State, Nigeria. *Community Development, 41*(2), 189-209.

Ajumako-Enyan-Essiam District Assembly. (2006). Ajumako-Enyan-Essiam District Information. Retrieved June 7, 2010, from http://aeeda.ghanadistricts.gov.gh/?arrow=dnf&_=53.

Akuoko-Asibey, A. (1996). A summative evaluation of a rural water supply programme in Ghana. *Applied Geography, 16*(3), 243-256.

Akuoko-Asibey, A. (1997). Views of selected government officials on the impact of a rural water supply program in Ghana. *Evaluation and Program Planning, 20*(2), 225-230.

Allan, J. A. (2005). Water in the environment/socio-economic development discourse: Sustainability, changing management paradigms and policy responses in a global system. *Government and Opposition, 40* (2), 181-199.

Anderies, J. M. (2006). Robustness, institutions, and large-scale change in social-ecological systems: The Hohokam of the Phoenix Basin. *Journal of Institutional Economics*, 2(2), 133-155.

Anderies, J. M., Janssen, M. A., & Ostrom, E. (2004). A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society, 9*(1), 18.

Asaba, R. B., Fagan, G., Kabonesa, C., & Mugumya, F. (2013). Beyond distance and time: gender and the burden of water collection in rural Uganda. *The Journal of Gender and Water.*

Athukorala, K. (1996). The need for gender analysis in strategic planning for effective water management in Sri Lanka. *Water Resources Development, 12*(4), 447-459.

Bamberger, M. (1988). Role of community participation in development planning and project management. In *EDI Policy Seminar Report* (Vol. 13). The World Bank.

Basurto, X. (2005). How locally designed access and use controls can prevent the tragedy of the commons in a Mexican small-scale fishing community. *Society and Natural Resources*, 18(7), 643-659.

Basurto, X. (2008). Biological and ecological mechanisms supporting marine self-governance: The Seri callo de hacha fishery in Mexico. *Ecology and Society,* 13(2), 20.

Baumann, E. (2009). May-day! May-day! Our handpumps are not working! *Rural Water Supply Network Perspectives No. 1.*

Berg, B. L. (2007). *Qualitative research methods for the social sciences* (6th ed.). Boston: Allyn and Bacon.

Boahen, A. A. (2004). Asante and Fante A.D. 1000-1800. In T. Falola (Ed.), *Africa in the Twentieth Century: The Adu Boahen reader* (pp. 181-200). Trenton: Africa World Press.

Braimoh, D., Lekoko, R., & Alade, E. B. (2004). Empowering women for development through community-driven sustainable programmes: A response to traditional patriarchal power in the Southern African Region. *Convergence, 37*(2), 79-89.

Breslin, E. D. (2010). Rethinking hydrophilanthropy: Smart money for transformative impact. *Journal of Contemporary Water Research & Education, 145*(1), 65-73.

Buor, D. (2004). Water needs and women's health in the Kumasi Metropolitan Area, Ghana. *Health & Place, 10*(2004), 85–103.

Buscher, B. E., & Mutimukuru, T. (2007). Buzzing too far? The ideological echo of global governance concepts on the local level: The case of the Mafungautsi Forest in Zimbabwe. *Development Southern Africa, 24*(5), 649-664.

Campbell, B., Mandondo, A., Nemarundwe, N., Sithole, B., De Jon, G, W., Luckert, M., & Matose, F. (2001). Challenges to proponents of common property resource systems: Despairing voices from the social forests of Zimbabwe. *World development, 29*(4), 589-600.

Carter, R. C. (2009). Operation and maintenance of rural water supplies: Challenging the community-based O&M paradigm. *Rural Water Supply Network Perspectives No. 2.*

Carter, R. C., Tyrrel, S. F., & Howsam, P. (1999). Impact and sustainability of community water supply and sanitation programs in developing countries. *Water and Environment, 13*(4), 292-296.

Central Intelligence Agency (Cartographer). (1996*). Ghana (Political)* [Map]. Washington DC: Central Intelligence Agency. Retrieved March 8, 2009 from http://www.lib.utexas.edu/maps/ghana.html.

Chapin III, F. S. (2009). Managing ecosystems sustainably: The key role of resilience. In F. S. Chapin III, G. P. Kofinas & C. Folke (Eds.), *Principles of ecosystem stewardship: Resilience-based natural resource management in a changing world.* New York: Springer.

Checkley, W., Gilman, R. H., Black, R. E., Epstein, L. D., Cabrera, L., Sterling, C. R., & Moulton, L. H. (2004). Effect of water and sanitation on childhood health in a poor Peruvian peri-urban community. *Lancet, 363*(9403), 112-118.

Chhatre, A., & Agrawal, A. (2008). *Forest commons and local enforcement.* Proceedings of the National Academy of Sciences, 105(36), 13286-13291.

Cleaver, F. (2007). Understanding agency in collective action. *Journal of Human Development, 8*(2), 223-244.

Cleaver, F., & Toner, A. (2006). The evolution of community water governance in Uchira, Tanzania: The implications for equality of access, sustainability and effectiveness. *Natural Resources Forum, 30*(3), 207-218.

Cox, M., Arnold, G., & Tomás, S. V. (2010). A review of design principles for community-based natural resource management. *Ecology and Society, 15*(4), 38.

Crona, B., & Hubacek, K. (2010). The right connections: How do social networks lubricate the machinery of natural resource governance? *Ecology and Society*, 15(4), 18.

Crowley, E. (2013). Ending poverty: Learning from good practices of small and marginal farmers. Self Employed Women's Association Exposure and Dialogue and the Food and Agricultural Organization, Rome.

Dapaah-Siakwan, S., & Gyau-Boakye, P. (2000). Hydrogeologic framework and borehole yields in Ghana. *Hydrogeology Journal, 8*(4), 405-416.

Devasia, L. (1998). Safe drinking water and its acquisition: Rural women's participation in water management in Maharashtra, India. *International Journal of Water Resources Development, 14*(4), 537-546.

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science*, 302(5652), 1907-1912.

Doe, S. R., & Khan, S. M. (2004). The boundaries and limits of community management: Lessons from the water sector in Ghana. *Community Development, 39*(4), 360-371.

Doyle, M. (June 27, 2013). EU aid to Africa badly spent, British inquiry hears, *BBC News Africa*. Retrieved from http://www.bbc.co.uk/news/world-africa-23087918.

Eguavoen, I. (2008). The political ecology of household water in Northern Ghana (Vol. 10): LIT Verlag Münster.

Engel, S., Iskandarani, M., & Useche, M. D. P. (2005). Improved water supply in the Ghanaian Volta Basin: Who uses it and who participates in community decision-making? *Discussion Paper*: International Food Policy Research Institute.

Esrey, S. A., Potash, J. B., Roberts, L., & Shiff, C. (1991). Effects of improved water supply and sanitation on ascariasis, diarrhea, dracunculiasis and trachoma. *Bulletin of the World Health Organization 69*(5), 609-619.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry, 12*(2), 219-245.

Fraser, E. D. G., Dougill, A. J., Mabee, W. E., Reed, M., & McAlpine, P. (2006). Bottom up and top down: analysis of participatory processes for sustainability indicator identification as a pathway to community empowerment and sustainable environmental management. *Environmental Management, 78*, 114-127.

Garande, T., & Dagg, S. (2005). Public participation and effective water governance at the local level: A case study from a small under-developed area in Chile. *Environment, Development and Sustainability, 7*(4), 417-431.

Gender and Water Alliance. (2006a). For her it's the big issue: Putting women at the centre of water supply, sanitation and hygiene *Evidence Report*. Dieren: Gender and Water Alliance.

Gender and Water Alliance. (2006b). *Resource guide: Mainstreaming gender in water management*. Dieren: Gender and Water Alliance.

Gleitsmann, B. A., Kroma, M. M., & Steenhuis, T. (2007). Analysis of a rural water supply project in three communities in Mali: Participation and sustainability. *Natural Resources Forum, 31*(2), 142-150.

Gruber, J. S. (2010). Key principles of community-based natural resource management: a synthesis and interpretation of identified effective approaches for managing the commons. *Environmental management, 45*(1), 52-66.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243-1248.

Harvey, P. (2008). Poverty reduction strategies: Opportunities and threats for sustainable rural water services in sub-Saharan Africa. *Progress in Development Studies, 8*(1), 115-128.

Harvey, P. A., & Reed, R. A. (2007). Community-managed water supplies in Africa: sustainable or dispensable? Community Development Journal, 42(3), 365-378.

Harvey, P., & Reed, R. (2003). *Sustainable rural water supply in Africa: rhetoric and reality.* Paper presented at the 29th WEDC Conference, Abuja, Nigeria.

Harvey, P., Ikumi, P., & Mutethia, D. (2003). Sustainable hand pump projects in Africa: Report on fieldwork in Kenya January 30-February 2003. *Leicestershire: WEDC.*

Huby, M., & Stevenson, S. (2003). Meeting need and achieving sustainability in water project interventions. *Progress in Development Studies 3*(3), 196–209.

Hunter, J. M. (1997a). Bore holes and the vanishing of guinea worm disease in Ghana's Upper Region. *Social Science & Medicine, 45*(1), 71-89.

Hunter, J. M. (1997b). Geographical patterns of guinea worm infestation in Ghana: An historical contribution. *Social Science & Medicine, 44*(1), 103-122.

Ivens, S. (2008). Does increased water access empower women? *Development, 51*(1), 63-67.

Iza, A., & Stein, R. (Eds.). (2009). *RULE: Reforming Water Resources Governance*. Gland, Switzerland: IUCN.

Jeris, L., Gajanayake, J., Jesima Ismail, S., Peris, E. A., Wanasundara, L., & Diyadawagamage, N. (2006). Grassroots empowerment of women: Portraits of four villages in Sri Lanka. *Convergence, XXXIX*(1), 61-75.

Jimenez, A., & Perez-Foguet, A. (2010). Challenges for water governance in rural water supply: lessons learned from Tanzania. *International Journal of Water Resources Development, 26*(2), 235-248.

Jingzhong, Y. (2008). The disempowered participation of the women's federation in international development projects. *Chinese Sociology and Anthropology, 40*(1), 38-48.

Kabeer, N. (1991). Gender, development, and training: Raising awareness in the planning process. *Development in Practice, 1* (3), 185-195.

Kelly, P. J. (2005). Practical suggestions for community interventions using participatory action research. *Public Health Nursing, 22*(1), 65-73.

Klooster, D. (2000). Institutional Choice, Community, and Struggle: A Case Study of Forest Co-Management in Mexico. World Development, 28(1), 1-20. doi: http://dx.doi.org/10.1016/S0305-750X(99)00108-4

Kobeissi, L., Nakkash, R., Ghantous, Z., Saad, M., & Yassin, N. (2011). Evaluating a community based participatory approach to research with disadvantaged women in the southern suburbs of Beirut. *Journal of Community Health, 36*(5), 741-747.

Koch, T., Selim, P., & Kralik, D. (2002). Enhancing lives through the development of a community-based participatory action research programme. *Journal of Clinical Nursing, 11*(1), 109-117.

Kroeger, A. (1983). Health interview surveys in developing countries: A review of the methods and results. *International Journal of Epidemiology*, 12(4), 465-481.

Lautze, J., de Silva, S., Giordano, M., & Sanford, L. (2011). Putting the cart before the horse: Water governance and IWRM. *Natural Resources Forum, 35*(1), 1-8.

Lucas, E. (2001). Social development strategies of a non-governmental grassroots women's organisation in Nigeria. *International Journal of Social Welfare, 10*(3).

Meek, C. L. (2012). Forms of collaboration and social fit in wildlife management: A comparison of policy networks in Alaska. *Global Environmental Change, 23*(23), 217-228.

Meinzen-Dick, R., DiGregorio, M., & McCarthy, N. (2004). Methods for studying collective action in rural development. *Agricultural Systems, 82*(3), 197-214.

Meinzen-Dick, R., Raju, K. V., & Gulati, A. (2002). What affects organization and collective action for managing resources? Evidence from canal irrigation systems in India. *World Development, 30*(4), 649-666.

Momsen, J. H. (2004). *Gender and development*. London: Routledge.

Montgomery, M., Bartram, J., & Elimelech, M. (2009). Increasing functional sustainability of water and sanitation supplies in rural Sub-Saharan Africa. *Environmental Engineering Science, 26*(5), 1017-1023.

Msukwa, C. A. P. S., & Taylor, D. (2011). Why can't development be managed more like a funeral? Challenging participatory practices. *Development in Practice, 21*(1), 59-72.

Opare, S. (2005). Engaging women in community decision-making processes in rural Ghana: Problems and Prospects. *Development in Practice, 15*(1), 90-99.

Ostrom, E. (1990). Governing the commons: The evolution of institutions for collective action. New York: Cambridge University Press.

Ostrom, E. (1995). Designing complexity to govern complexity. In Hanna. S. & Munasingh. M. (Eds.), *Property Rights and the Environment: Social and Ecological Issues* (pp. 33-45). Stockholm: The Beijer Institute; Washington DC: The World Bank.

Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science, 325*(419), 419-422.

Plate, D. K., Strassmann, B. I., & Wilson, M. L. (2004). Water sources are associated with childhood diarrhoea prevalence in rural East-Central Mali. *Tropical Medicine and International Health, 9*(3), 416-425.

Prokopy, L. S. (2005). The relationship between participation and project outcomes: Evidence from rural water supply projects in India. *World Development, 33*(11).

Regmi, S. C., & Fawcett, B. (1999). Integrating gender needs into drinking-water projects in Nepal. *Gender & Development, 7*(3), 62-72.

Robson, S., & Spence, J. (2011). The erosion of feminist self and identity in community development theory and practice. *Community Development Journal, 46*(3), 288-301.

Rogers, P. P. (2006). Water governance, water security and water sustainability. In P. P. Rogers, M. R. Llamas & L. M. Cortina (Eds.), *Water crisis: Myth or reality?: Marcelino Botin Water Forum 2004*. Leiden: Taylor & Francis Group.

Rogers, P., & Hall, A. W. (2003). *Effective water governance*. Stockholm: Global Water Partnership.

Sam, J.-M. (2011). How does improved access to clean water impact rural communities? Evaluating impacts of water projects in the Ajumako-Enyan-Essiam District, Ghana. Master of Science, University of Alaska Fairbanks, Fairbanks.

Sarfo-Mensah, P., & Oduro, W. (2007). Traditional natural resources management practices and biodiversity conservation in Ghana: A review of local concepts and issues on change and sustainability. Fondazione Eni Enrico Mattei (FEEM) Working Paper No. 90.2007.

Sarfo-Mensah, P., & Oduro, W. (2010). Changes in beliefs and perceptions about the natural environment in the Forest-Savanna Transitional Zone of Ghana: The influence of religion. Fondazione Eni Enrico Mattei (FEEM) Working Paper No. 8.2010.

Sarfo-Mensah, P., Oduro, W., Antoh Fredua, E., & Amisah, S. (2010). Traditional representations of the natural environment and biodiversity conservation: Sacred groves in Ghana: Nota di lavoro//Fondazione Eni Enrico Mattei: Global challenges.

Sattler, C., Schröter, B., Jericó-Daminello, C., Sessin-Dilascio, K., Meyer, C., Matzdorf, B., . . . Giersch, G. (2015). Understanding governance structures in community management of ecosystems and natural resources: The Marujá case study in Brazil. *Ecosystem Services*.

Savin-Baden, M., & Wimpenny, K. (2007). Exploring and implementing Participatory Action Research. *Journal of Geography in Higher Education, 31*(2), 331-343.

Schouten, T., & Moriarty, P. (2003). *Community Water, Community Management: From System to Service in Rural Areas.* London: Intermediate Technology Development Group.

Sen, A. (2000). *Development as freedom.* New York: Anchor Books.

Sillitoe, P. (1998). The development of indigenous knowledge: A new Applied Anthropology. *Current Anthropology, 39*(2), 223-252.

Silverman, D. (2006). *Interprepeting qualitative data* (3rd ed.). London: Sage Publications.

Soanes, C., & Stevenson, A. (Eds.). (2008) Dictionary, Concise Oxford English (11 ed.). New York: Oxford University Press.

Sutton, S., & Kayaga, S. (2005). The sub-Saharan potential for household level water supply improvement. Paper presented at the 31st WEDC International Conference, Kampala, Uganda, 2005.

Swatuk, L. A. (2005). From "project" to "context": Community-based natural resource management in Botswana. *Global Environmental Politics, 5*(3), 95-124.

Tay, V. (2005). The Child Health Millennium Development Goal: What water, sanitation and hygiene can do in Ghana. *WELL Country Note.* Leicestershire: Loughborough University.

Thomas, E. P. (2002). Local participation in development initiatives: The potential contribution of an understanding of social capital. *Urban Forum, 13*(2), 116-131.

Tortajada, C. (2010). Water governance: Some critical issues. *Water Resources Development, 26*(2), 297-307.

Tropp, H. (2007). Water governance: Trends and needs for new capacity development. *Water Policy, 9*, 19.

United Nations International Children's Emergency Fund, & World Health Organization. (2015). Progress on sanitation and drinking water: 2015 update and MDG assessment. *WHO: Geneva, Switzerland.*

United Nations International Children's Emergency Fund (UNICEF), & World Health Organization (WHO). (2012). Progress on drinking water and sanitation: 2012 update. UNICEF - New York, and WHO - Geneva.

United Nations Development Program (UNDP). (2006). Human Development Report 2006 - Beyond Scarcity: Power, Poverty and the Global Water Crisis. New York: UNDP.

United Nations Economic and Social Council. (2009). Policies to improve the access to safe drinking water and basic sanitation. Ghana, 2007. *Annual Ministerial Reviews.*

United Nations General Assembly. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations.

VOA News. (2009, July 20). Ghana fights guinea worm. *News article.* Retrieved from http://www.voanews.com/uspolicy/2009-07-13-voa1.cfm

Wade, R. (1987). The management of common property resources: Finding a cooperative solution. *The World Bank Research Observer, 2*(2), 219-234.

Wakeman, W., Davis, S., Wijk, C. V., Naithani, A., & Mundial, B. (1996). (1996). *Sourcebook for gender issues at the policy level in the water and sanitation sector.* Washington: World Bank.

Wetmore, S. B., & Theron, F. (1998). Community development and research: Participatory learning and action – A development strategy in itself. *Development Southern Africa, 15*(1), 29.

Wood, M. (1993). A handpump for Africa: The Afridev experience. *Waterlines, 11*(4), 29-31.

Yin, R. K. (1984). *Case study research: Design and methods*. Newbury Park: SAGE.

This page intentionally left blank

APPENDICES

Appendix A: Comparison of Village Performance and Scores

(In order from highest to lowest total score)

Characteristic	Benchmarks	Badukrom	Awordo	Afranse	Ogoekrom	Budukwaa	Eyiakrom	Etsii Abeka	Atwereboanda
DEPENDENT VARIABLE									
Sustainability of the water facility	Was it working at the time of study?	2	2	1	2	2	0	2	1
	Has the handpump ever broken down?	2	0	0	0	0	0	0	0
	How long did it take to get repairs?	6	5	5	3	4	0	4	3
	Total for Sustainability, the dependent variable	**10**	**7**	**6**	**5**	**6**	**0**	**6**	**4**
INDEPENDENT VARIABLES									
A. Demonstrated ability to manage local projects	1. Clearly defined, equitable and well-enforced rules governing local projects	2	2	2	1	1	1	1	0
	2. Effective conflict resolution mechanisms	2	2	2	1	1	1	1	1
	3. Monitoring	2	2	2	2	2	2	2	1
	4. Provisions for technical support (know who to contact, etc)	2	2	2	2	2	2	2	2
	5. Diligence on pump maintenance (tighten bolts, watch for signs of wear, etc)	2	2	2	2	2	2	2	0
	6. Cleanliness of the pump area	2	2	0	2	2	2	0	0
	7. Role of leadership in managing water project	2	2	2	2	2	2	1	1
	8. Predictability of rules and regulations governing local projects	2	2	2	2	2	2	1	0
	9. Responsiveness in enforcing rules and regulations governing local projects	2	2	2	2	2	2	0	0
B. Financial management of local projects	10. Fee schedule is set (water fee policy)	2	2	2	1	0	2	2	0
	11. Fees are actually collected	2	2	2	1	0	0	2	0
	11a. Water fee records presented	2	0	2	1	0	0	0	0
	11b. Someone is employed/appointed to collect payments	2	2	2	0	0	0	0	0
	12. Verification of savings account and money available when needed.	2	0	1	0	1	0	0	0
	12a. Able to present bankbook	2	0	0	0	0	0	2	0
	12b. Evidence of regular contributions to savings account	2	0	0	0	0	0	0	0
	12c. How much have they been saving?	2	0	0	0	0	0	0	0
	13. Someone is employed/appointed to clean the water point facility	2	2	2	1	1	1	1	1
	14. Accountability & Transparency	2	0	1	1	1	0	0	0

Comparison of village performance and scores (continued)

Characteristic	Benchmarks	Badukrom	Awordo	Afranse	Ogoekrom	Budukwaa	Eyiakrom	Etsii Abeka	Atwereboanda
INDEPENDENT VARIABLES									
C. Voluntary participation in community projects	15. Participatory decision-making	2	2	2	2	1	1	1	1
	16a. Meeting times that are convenient	2	2	2	2	1	1	1	1
	16b. Meeting times that have strong participation by community	2	2	2	2	1	1	1	1
	17. Sense of ownership toward local projects	2	2	2	1	2	1	1	0
	18. Sense of responsibility toward local projects	2	2	2	1	2	1	1	0
	19. Social cohesion	2	2	2	2	2	2	1	0
D. Role of women within the community	20. Status of women in community 20a. Women's influence in the community	2	2	1	2	1	1	1	1
	20b. Women's active participation in decision-making	2	2	1	1	1	1	1	1
	21. Level of women's participation in community efforts (women's involvement, contribution and acceptance of organizational responsibility)	2	2	2	2	2	2	2	2
	22. Impact of pump training	2	2	2	2	2	**1**	**1**	**1**
E. Widespread understanding of the benefits of a water facility	23. To what extent is the facility being used?	2	0	0	2	0	0	2	0
	24. Knowledge of health importance of using clean water	2	2	2	2	2	2	2	2
	25. Level of support for charging for water	2	2	2	2	2	2	2	0
	26. Perceptions of reliability of water facility	2	2	2	2	2	0	2	1
	27. Attitude toward location of water facility	2	2	1	2	2	0	1	0
Total for Independent Variables (out of 68 points possible)		**68**	**54**	**53**	**48**	**42**	**37**	**35**	**17**
	Average Score, All 6 Categories	5.35	4.22	4.14	3.78	3.30	2.89	2.73	1.32

Appendix B: Interview Guide

Purpose

To discuss your views, observations and expectations about your water project.

Community Data	Respondent Data
Name:	Gender:
Source(s) of water supply:	Occupation:
Estimated population:	Position

Age of Respondent: ☐18-29yrs ☐30-39yrs ☐40-49yrs ☐50-69yrs ☐70+

Maximum level of education attained: ☐ Primary School ☐ Junior High School ☐ Senior High ☐ Tertiary ☐ Other (*please specify*)

Background on village:

CHARACTERISTIC	VARIABLE
A. Demonstrated ability to manage local projects	1. Clearly defined, equitable and well-enforced rules governing local projects
	2. Effective conflict resolution mechanisms
	3. Monitoring
	4. Provisions for technical support (know who to contact, etc)
	5. Diligence on pump maintenance (tighten bolts, watch for signs of wear, etc)
	6. Cleanliness of the pump area.
	7. Role of leadership in local projects
	8. Predictability of rules and regulations governing local projects
	9. Responsiveness in enforcing rules and regulations governing local projects
B. Financial management of local projects	10. Fee schedule is set
	11. Fees are actually collected
	12. Verification of savings account and money available when needed.
	13. Accountability & Transparency
C. Voluntary participation in community projects	14. Participatory decision-making
	15. Meeting times that are convenient and have strong participation by community
	16. Sense of ownership toward local projects
	17. Sense of responsibility toward local projects
	18. Social cohesion
	19. Past approach to community water issues.
D. Role of women within the community	20. Status of women in community, women's influence in the community, women's active participation in decision-making
	21. Level of women's participation in community efforts; women's involvement, contribution and acceptance of organizational responsibility
	22. Impact of technical training for pump maintenance
E. Widespread understanding of the benefits of a water facility	23. To what extent is the facility being used?
	24. Knowledge of health importance of using clean water
	25. Attitude toward location of water facility
	26. Perceived cost of buying water
	27. Perceptions of reliability of water facility

Appendix C: Village Notes

This section contains data gathered from study communities during fieldwork from September to December 2013.

C-1 Afranse

The population of Afranse was 565 according to the 2010 population census. Key respondents indicated that most of the populations are below the age of 50 and that women are in the majority. My respondents in Afranse included three men and two women. The male respondents included the 51-year-old *Obrahen* (assistant to the chief), the town committee chair (age 56), and the 51-year-old chair of the WATSAN committee. The women interviewed included a 46-year-old member of a nonprofit called Hope for Future Leaders, and the 58-year-old Queen Mother of the village.

C-1.1 Demonstrated ability to manage local projects

Afranse met most of the criteria for demonstrated ability to manage local projects. Like other project villages, Afranse has a seven-member Water and Sanitation (WATSAN) committee with responsibility to coordinate the day-to-day management of the water facility. Two of its members had recently passed away at the time of the study, and plans were in place to nominate successors. The village also has an eleven-member town committee that works with the chief and elders to govern affairs. While WATSAN members were appointed, Town Committee members were elected for a four-year term.

C-1.1a) Clearly defined, equitable and well-enforced rules governing local projects

Besides the water project, Afranse was constructing a community center (built with cement blocks) for hosting events at the time of fieldwork in summer 2013. All residents were expected to contribute to the project by providing labor, food for workers or donating money.

The WATSAN committee chair described three rules as governing the use of the handpump. These include banning children less than 10 years from operating the facility, instituting water point payment of 10 pesewas (5 cents at 2013 rate of exchange) for each five-gallon container, and prohibiting

footwear on the pump platform. To enforce these rules, the pump is locked and a male caretaker employed to collect fees from residents who go to fetch water.

C-1.1b) Effective conflict resolution mechanisms

The village has effective conflict resolution mechanisms. The *Obrahen* explained that he has the traditional mandate to settle disputes among community members and to preserve peace. He said disputes are typically settled internally through issuing warnings and fines as necessary. All respondents conceded that no disputes had risen concerning the rules governing the use of the pump. They believed it was because residents understood that the regulations were necessary to prevent the frequent breakdowns that had plagued their hand pumps for years.

C-1.1c) Monitoring

The WATSAN committee is in charge of monitoring the water facility. Respondents also mentioned that the monitoring visits conducted by the implementers of the water program (REDEP and Nyarkoa Foundation) had been helpful in addressing the recurring breakdown of their water facilities (see Chapter 4, section A4 for details on monitoring).

C-1.1d) Functionality of existing water facility

Afranse has two hand pumps, but one was broken when I visited in the summer of 2013. For a long time, residents believed that the god of a nearby spring resented residents using the pump so he caused the frequent breakdowns of the pump. However, it was later revealed that a dishonest technician used inferior parts to make repairs and that caused the breakdowns.

The village executives told me they now know the problem was a purely technical issue, but conceded that some residents still believe in a supernatural influence. In any case, residents hope to raise enough money to replace the broken hand pump. This is a very expensive proposition for a small village; a new pump could cost up to USD 1,500.

C-1.1e) Diligence on pump maintenance and provisions for technical support

Respondents explained that, for years, the community employed the services of a pump technician who turned out to be incompetent and corrupt. He was the source of the frequent breakdowns that had been attributed to the river god. Two female WATSAN committee members have been trained to handle minor pump maintenance and repair issues. They are now responsible for notifying competent technicians in case of major pump problems.

C-1.1f) Cleanliness of the pump area

The (male) caretaker employed to collect money also cleans the pump area.

C-1.1g) Role of leadership in water project

It was evident that, in Afranse, the management of the hand pumps was a joint effort between the WATSAN committee and the village committee, with both groups working in concert to establish rules and enforce them. In fact, the chief's assistant (the *Obrahen*) is also the treasurer of the village committee, and keeps a record of water sales.

C-1.2 Financial management of local projects

As stated, a fixed water fee has been set and water point payment instituted to ensure compliance (i.e. residents pay to fetch water). There are records showing that the water fees are actually collected. The community could not show the bankbook at the time of fieldwork in September 2013 as proof of savings account. They were however able to show the bankbook a year later (December 2014), as indicated in the monitoring report from REDEP.

Respondents reported a high degree of cooperation regarding the rules governing the use of the hand pump. The community is determined to prevent further breakdowns of the only functioning hand pump, and to eventually replace the one that is out of order. To this end, residents have introduced water point collection of user fees (pay by the bucket).

Employing a caretaker and instituting restrictions to prevent misuse point to Afranse's commitment to the success of their water facility. However, residents appeared more focused on building a community center than repairing the faulty hand pump that would provide a more convenient water source for those living in the southern part of the village.

Afranse has a community school that also serves neighboring villages. According to respondents, all school-aged children are enrolled, and parents are an active part of the school's support system.

C-1.3 Voluntary participation in community projects

According to respondents, the chief, elders and village executives call community meetings when there are pending issues. Meetings are typically held on off-farm days, (which are taboo days when no one allowed in the farms), and all adult residents are expected to attend. Issues are discussed at length and decisions taken by consensus. However, the WATSAN chair admitted that the decision to lock the pump had not been subjected to the usual debate. He explained that the village executives, determined to halt the recurrent pump failures, presented the idea to the chief and elders. A meeting was thereafter convened to inform residents of the new directive and explain the reasoning behind it.

C-1.4 Active role of women within the community

There are three women on the nine-member village committee, though none hold executive positions. Three women serve on the WATSAN committee, along with four men (two of whom have passed away and had not yet been replaced at the time of the interviews). Only one of the women holds an executive position as a treasurer. However, she does not actually handle any financial issues.

Two women who participated in the training program are in charge of contacting technicians when problems develop. It is interesting to note that one of them, an 18-year-old high school student, explained that participating in the training program had given her confidence to enforce pump rules.

The women in the village are mostly subsistent farmers and traders. However, there is a young woman who is a trained teacher.

C-1.5 Widespread understanding of the benefits of clean water

Despite widespread awareness of the health risks of using unprotected water, respondents admitted that some residents used the stream along with the pump. While one reason could be preference, it is also possible that the stream is more easily accessible to those living in the southern part of the village, where the broken down pump is located.

C-1.6 Summary

It was evident that Afranse had discovered an effective way of managing its water project. It is noteworthy that two factors prompted the adoption of this new strategy: The first was a growing weariness at sinking money into pump repairs, and the second was the new awareness about the high cost of purchasing spare parts (learned during the pump training workshop). As far as determining characteristics for a successful project village, Afranse comes across as a community that has taken important lessons from past challenges and is determined to improve its situation. Issues concerning the continued patronage of the stream need to be addressed, but this cannot be done until all residents have equally convenient access to clean water from the wells. Table C-1 below summarizes findings in Afranse.

Table C-1. Summary of findings in Afranse

Variable	Findings in Afranse
Demonstrated ability to manage local projects	Joint efforts of WATSAN and village committee lead to adoption of new regulations: a) Pump is locked and a caretaker employed to clean area and collect money. b) Children under 10 years old are not allowed to operate the pump. c) Patrons are expected to leave footwear outside the pump platform to avoid contamination. Strong social cohesion evident in observance of rules concerning use of hand pump. The community is determined to prevent further breakdowns of the only functioning hand pump, and to eventually replace the one that is out of order. To this end, residents have: a) Fired a former technician considered corrupt and incompetent in favor of a more reliable one. b) Introduced water point collection of user fees (pay by the bucket). Afranse has a community school that also serves neighboring villages. According to respondents, all school-aged children are enrolled, and parents are an active part of the school's support system.
Financial management of local projects	A fixed water fee has been set and water point payment instituted to ensure compliance (i.e. residents pay to fetch water). There are records showing that the water fees are actually collected. However, the community could not show the bankbook as proof of savings account.
Voluntary participation in community projects	Chief, elders and village executives call community meetings when there are pending issues. Meetings are typically held on off-farm days, and all adult residents are expected to attend. Issues are discussed at length and decisions taken by consensus.
Active role of women within the community	There are three women on the nine-member village committee, though none hold executive positions. Three women serve on the WATSAN committee, along with four men (two of whom have passed away). Only one of the women holds an executive position as a treasurer. However, she does not actually handle any financial issues. Two women who participated in the training program are in charge of contacting technicians when faults develop. An 18-year-old trainee explained that participating in the training program had given her confidence to enforce pump rules. The women in the village are mostly subsistent farmers and petty traders. However, there is a young woman who is a trained teacher.
Widespread understanding of the benefits of clean water	Despite widespread awareness of the health risks of using unprotected water, respondents admitted that some residents used the stream alongside the pump. One reason could be taste preference, but it is also possible that the stream is more easily assessable to those living in the southern part of the village, where the broken pump is located.
Other indicators	According to respondents, the community has employed people to clean the whole village (public spaces) on a daily basis.

C-2 Atwereboanda

In Atwereboanda, I interviewed three members of the WATSAN committee (two women and a man), as well as two members of the town committee, both male. The two female WATSAN members were the hygiene educator and the pump caretaker, both 44 years old, while the man was the 57-year-old chair. Both women participated in the pump training in October 2013. The town committee members were the 74-year-old chair and the 45-year-old secretary. . Of the three men, two were members of the town committee, while the third was a WATSAN member.

The exact date for its establishment is uncertain, but Atwereboanda was founded by a prolific hunter who camped in the area and earned the nickname that later became the name of the village. It is said that he was so successful as a hunter that his hunting gun (*Atwereboa*) "never slept" (*nda*), hence the name Atwereboanda. My respondents told me that present-day residents comprise the descendants of the famed hunter, as well as other settlers.

Like all villages in the district, Atwereboanda is set in deep woods. The surrounding area is mostly forest with cleared tracts of farmland. Residents are predominantly subsistence farmers, with a few augmenting their income with petty trading, masonry, carpentry and tailoring. The village lies about three kilometers from the nearest paved road, making it relatively easy to access both by vehicle and on foot. Because of its strategic location, it houses a public elementary school that serves about seven other outlying villages. Having a community school is a significant advantage, because it means children from that village do not have to make the two to three kilometer journey that students from surrounding villages have to undertake.

The school is the first structure encountered on entering the village from the paved road. It is situated about 400 meters from the main township. A cluster of acacia trees provides shade, doubling as a playground and mini-market for food vendors. Houses in the village are mostly built of mud, with scattered concrete ones. The 2010 census estimates its population at 352. My respondents estimated that women formed the majority of residents, and that there are more youth than elderly people.

Atwereboanda was one of the first two communities to benefit from the Nyarkoa Foundation/REDEP water program in 2008 by having a pump repaired. In 2009 however, I discovered during fieldwork that it was not being used for two reasons. The first was that most residents considered the water "salty"and preferred to use Ochi, the river about 1 km away. The second was that the pump was located in a swampy area, thus making it difficult to access during the rainy season.

Another handpump was installed in the village in 2012, this time situated in the upper part of the community. In spite of this, residents have failed to adopt any coordinated effort to manage their water facilities. Nevertheless, the two female members of the WATSAN committee (two male members died earlier in the year and the other relocated) continue to encourage residents to show better interest in the maintenance of the water facilities.

C-2.1 Demonstrated ability to manage local projects

Atwereboanda currently has challenges establishing effective management structures to govern their water project, but it appears to be due to a lack of coordination between village executives and the WATSAN committee. A traditional chief governs the village with the assistance of a four-member Town Committee, comprising two men and two women (I interviewed both male members of the town committee).

Besides the water project, Atwereboanda has an on-going communal cleaning program that entails mass participation in regular cleaning exercises. My respondents told me that residents actively participate in the cleaning program, in contrast with attitudes toward observing rules of water use. This situation is caused by two interesting factors, which will be discussed shortly.

C-2.1a) Clearly defined, equitable and well-enforced rules governing local projects

Residents understand that participation in cleaning exercises and paying community levies is mandatory, and that they will be penalized if they fail to do so. No similar measures have been established

for the water project. Respondents told me that the rules would be duly enforced once the community gets together to formulate them.

C-2.1b) Effective conflict resolution mechanisms

As mentioned, the community has penalties to deal with residents who refuse to comply with established regulations. There are currently no measures against failing to attend meetings, but there are sanctions against failing to pay levies and participate in communal work. Culprits get summoned by the chief, and are subsequently fined. Failure to pay the fine results in police action. The town committee chair elaborated:

> There are no measures against failing to attend meetings, but we do have penalties for refusing to pay established levies. We can even take culprits to the police station. Yes, because the levy is supposed to help take care of things within the community, so if you refuse to pay, we'll take you to the police station.

I found it interesting to hear about the police action, and I initially thought it unlikely that it went beyond a threat. However, the town committee chair assured me the community had taken police action against residents in the past. He told me the most recent episode was just two months before the interview, and actually turned out to be a close call; the two culprits paid once they realized the Assemblyman (the local government representative was involved), and the leaders were serious about reporting them to the police:

> Yes, we've taken people to the police station before. [The last time was] not too long. In fact, there was a recent one that would have been taken to the police station. The Assemblyman led the charge. That was less than two months ago. We called them to the chief's palace several times. The Assemblyman was actively involved. They hurriedly found the money to pay.

C-2.1c) Monitoring

After speaking to my respondents, it became evident that monitoring community projects in Atwereboanda would be more effective with improved coordination among the leadership (that is, the chief and executives of the WATSAN and town committees). The town committee members that I interviewed maintained they (the town committee) were unaware of difficulties faced by WATSAN members in setting rules for use of the water facilities. While they were aware that residents failed to turn up for a meeting called shortly after the training program, they had not been informed that part of the agenda for the proposed meeting was to establish water use regulations.

It turns out that when the hygiene educator and pump caretaker returned from the training, they informed the chief that it was necessary to institute a financial policy for use of the water facilities. The chief therefore called the meeting to enable the trainees to present their report to the community and also set a financial policy. However, only the chief and members of the two committees showed up for the meeting. It was when I asked the town committee chair what measures were being taken to ensure members paid the water levy that he explained the committee was unaware, but stated his committee's intention to take action on the matter:

> Well, if he [the chief] had informed us, we would have made it part of our agenda. We would have put in on file so as to be guided by it.... So once the WATSAN committee brings our attention to any issues, considering that it is the responsibility of the whole community, we will act quickly on it—we ought to ensure that the right thing is done—that everything runs smoothly. So as far as selling the water – as long as we've been informed about the problems, we'll let the people—we the town committee will make a "by force" announcement (i.e. issue summons) for everyone to gather at this meeting venue. Anyone who refuses to attend will be dealt with. And then we'll discuss—inform the people about all the issues concerning the water. Then we can

decide whether to sell it or use community funds to finance repairs when it breaks down. It's the community's money.

In an apparent show of solidarity between the two committees, the town committee chair went on to say that he and his committee acknowledged that part of the WATSAN committee was to monitor environmental cleanliness. He said a few months earlier, he had announced to the entire community that the "WATSAN members were still in charge of monitoring environmental cleanliness, so anyone who failed to clean their backyards would be queried." This was done to dispel any misconceptions stemming from the reconstitution of the town committee a year earlier.

C-2.1d) Functionality of existing water facility

Both water facilities are currently in good working condition. The last repair work was done in 2010, and the WATSAN chair told me they were "lucky it hasn't broken down since then," because it would be hard to find money for repairs.

C-2.1e) Diligence on pump maintenance and provisions for technical support

As mentioned, one of the pumps was repaired in 2011, and neither has broken down since. Respondents said in the past they called in a technician for repairs. When I asked respondents whom they would call for repairs in the future, they each said that the women who attended the training would handle the repairs. It was particularly remarkable to witness the confidence with which the hygiene educator responded: "You know, I can do it.… As long as we get money to buy the parts, I can do it. The other day I went to tighten bolts on the one over there."

Granted, this is a bit ambitious, considering the training only equipped them to perform minor repairs. Nonetheless, it is inspiring to see such confidence in a woman who has barely two years of primary education and lives in a patriarchal community. The role of women within the community will be discussed below.

C-2.1f) Cleanliness of the pump area

Both pumps were clean at the time that I visited the community. The hygiene educator told me that she had called out residents to clean the surroundings the day before the interview.

C-2.1g) Role of leadership in water project

Respondents told me that the chief and town committee members support WATSAN members in executing their duties. When I asked the town committee secretary about the specific role of his committee in the water project, he responded:

> Well, we've appointed a committee to handle the affairs of the water, and we offer them support. So we help them in performing their duties, make sure the community does what they ask them to.... Part of it is, we give out announcements so people know they have to clean the water area when it gets dirty.

As mentioned, better coordination is needed to make such support more effective than is currently the case.

C-2.2 Financial management of local projects

I learned from my respondents that residents lost interest in paying for the water, because those in charge failed to render account after a year of selling the water. As the hygiene education explained: "At first we sold it, but we never saw the money....We sold it for about a year, but they rendered no account to us so we lost interest."

The town committee secretary was quick to point out who exactly was responsible for mismanaging the proceeds:

> Actually, we were appointed [to the town committee] less that a year ago. So, it was those formally in charge who mismanaged the proceeds from the sale. So, at the time we were

appointed a year ago people were fetching the water free; selling water had long ceased, and people just fetched for free.

The last time residents contributed directly to the water project was in 2011, when they paid a one-time levy to finance repairs. Hence, there are no current financial arrangements in place concerning the two hand pumps, though the village executives plan to have one in place soon.

However, the community has a strategy for raising contingency funds; instituting one-time levies. It turns out this method has proved quite effective in the past.

C-2.3 Voluntary participation in community projects

Resident's attitude toward community projects could best be described as "coerced participation." They do heed calls to clean the environment (and pay levies), but as the town committee chair told me, it is because "They're afraid. They know they'll be penalized—as long as the town committee is involved, they know they'd be fined if they didn't show up. And they'd be arrested if they refused to pay the fine."

Making decisions about community issues—such as managing the water project—is largely participatory. As the hygiene educator told me, "We all meet and discuss, and arrive at a decision." However, there are some decisions that are not debatable. The town committee chair explained the clear differences between decisions made democratically, and those issued by edict:

> And that is different from Nana's (the chief's) stipulated laws. For example, if you disturb the peace—quarrel or curse at someone—there are fixed penalties for those offenses. Those issues are not debated. And then when it comes to issues like deciding whether to collect monthly levies or sell the water, that gets discussed by all of us, for everyone to express their views. It's based on such debates that we can know what course to take.

Respondents told me that meetings are held on Tuesdays, which is an off-farm day, and that residents are given ample notice. The Town Committee chair noted that the incident where residents failed to show up for a meeting was indeed a rare occurrence. In fact, the description of that incident sounds more like a premeditated mass boycott than a random act of disobedience, an observation buttressed by what the hygiene educator said when I asked her opinion about possible reasons for people's refusal to attend the meeting. Apparently, many residents felt embittered to be excluded from what they regarded as a treat enjoyed by the training participants: "They said we had gone to eat [feast], collect money.... It's been said to my face; that we've gone to eat the food and we're coming to bother them."

To some extent, one could understand residents' indignation at feeling left out, for a three-day, out-of-town, all-expenses-paid workshop seems very much like a treat for subsistence farmers with grueling work schedules. Perhaps much of this misconception would have been avoided if, prior to the training, the whole community had been fully informed about the objectives of the trip their representatives were embarking on (which did not happen in this instance).

The chief and village executives appear to be the only ones committed to sustaining the water facilities. According to all five respondents, residents refused to turn up for a meeting called by the chief to discuss outcomes of a pump training program organized in October by REDEP/Nyarkoa Foundation. In spite of this, the hygiene educator believed that residents do regard the water facilities as their property, even if their actions do not always show it: "They've accepted it; they just find it difficult to do the necessary work that goes with it."

When I asked what proof she had of this assertion, she responded:

> If they hadn't accepted it, they wouldn't heed calls to do communal work to tidy the surroundings. Anytime we issue a call for cleaning, they heed it. For example, yesterday I noticed the area was quite dirty, so I informed the town committee. They issued a call this morning and

they all came [to clean the area]…. There's no one who will refuse to show up for cleaning around the pump.

She conceded that supervising the community was an uphill task: "It's just difficult to deal with it; it's hard to know what they're up to."

Residents do participate in communal work and pay levies, but that is mainly because they fear the consequences for not doing so. As the town committee secretary pointed out, the clearest incentive for observing rules is coercion. The WATSAN chair also observed that residents "won't take that initiative; you'll have to tell them. They are not up to volunteering to do things."

Residents' true attitudes are revealed by their behavior when there is no one around to enforce the laws. The hygiene educator told me that for some time now, residents have persisted in dumping refuse farther away from the designated garbage dump. She took me to the disposal site, and as we neared the place, we saw garbage strewn along the path leading to it, thus getting rubbish uncomfortably close to houses in that vicinity. She said residents have ignored numerous calls to stop the practice, and it is impossible to enforce sanctions because nobody knows the identity of the culprits. She thought children might be the most likely offenders, but also admitted adults could be just as culpable.

Respondents told me that education was an important priority for the community. Not only are residents actively involved in the community school, but also they are currently making efforts to establish a kindergarten.

C-2.4 Active role of women within the community

The two women on the WATSAN committee are the most active members of the committee (and the community as a whole) when it comes to managing the water project and enforcing environmental cleanliness. In particular, the hygiene educator has demonstrated strong leadership since the project first started. During the community consultation meeting in 2008 (during which the program implementers

formally presented the proposal to community members), she was the first to volunteer to serve on the proposed WATSAN committee. She has remained active all through the years, and is in many ways the conscience of the community. She was a keen participant at the training program, and is eager to put her newly acquired skills into practice. It also became apparent that the two women are mutually supportive of each other.

Besides the two WATSAN officials, respondents told me that there are two women serving on the four-member town committee. This is noteworthy, considering the traditionally patriarchal nature of the community. Yet, it may not be so out of place even within that environment, given the strong leadership and dedication that the two WATSAN women have exhibited over the years.

C-2.5 Widespread understanding of the benefits of clean water

Findings showed that only a small section of the community truly appreciates the benefits of a clean water facility, considering that a good number of residents still patronize the stream. The two WATSAN members are certainly aware of the benefits and are doing their best to help the project succeed.

C-2.6 Other Indications: Level of commitment by WATSAN officials

After speaking to the five executives, it became clear to me that what has kept the project in Atwereboanda going is the strong commitment by WATSAN committee members and the voluntary spirit that spurs them on in the face of widespread apathy. Specifically, it is the tireless efforts of the only women on the WATSAN committee that has guaranteed the continued survival of the project. Most importantly, by not abandoning their positions and maintaining contact with the program implementers (Nyarkoa Foundation and REDEP) over the years the women made it possible for Atwereboanda to benefit from available technical assistance. In fact, it was the zeal displayed by the two women at the training that encouraged me to include Atwereboanda in this study.

Their commitment is remarkable, considering that they have done so at significant cost to their self-esteem; they have been called names and shunned in the course of performing their duty. For example, the hygiene educator told me about an incident that happened when she tried to stop children from operating the hand pump: "When I told people to stop their children from operating the pump, they asked me if I was the watchman for the water. That really hurt me, and I complained to Nana [the chief]."

I should mention, that used in this context, "watchman" in Ghanaian parlance is a derogatory term, and is a way of dismissing her as a busybody.

Similarly, the pump caretaker was so disturbed by residents' refusal to attend the post-training briefing meeting that she initially declined to participate in the interview, but later relented. A statement made by the hygiene educator best sums up the attitude of these two women:

> The thing is, people have the impression that whenever we are called to these programs we are given money. Yet, there is no payment involved; it's all voluntary work. And it's just like learning a trade. Other people can call me to repair their hand pumps.

C-2.7. Summary

It is obvious from the foregoing that an interesting combination of factors make Atwereboanda a potentially successful candidate for a community water project. The village receives top points for women's role in managing community projects and dedicated service by WATSAN members. Yet, it needs stronger synergy among its leaders to formulate clearly defined and equitable water use regulations, and to enforce them. It is also essential to identify and address the root cause of residents' apathy and lack of initiative, for a truly successful community project requires total dedication and meaningful participation by community members. Table C-2 below summarizes findings in Atwereboanda.

Table C-2. Summary of findings in Atwereboanda

Variable	Findings in Atwereboanda
Demonstrated ability to manage local projects	WATSAN members keep telling residents not to allow children to operate the pump, but people ignore them. The two town committee members that I interviewed resolved to take up the matter by calling a meeting to decide on rules such as whether to close the pump, sell water, pay monthly dues, or wait to collect money for repairs when the need arises. The village has stipulated measures for dealing with residents who refuse to pay dues and participate in communal work—fine or be reported to the police.
Financial management of local projects	Residents lost interest in paying for the water when those in charge failed to render account after a year of selling the water. The last time residents contributed directly to the water project was in 2011, when they paid a one-time levy to finance repairs. Hence, there are no current financial arrangements in place concerning the two hand pumps, though the village executives plan to have one in place soon. It is interesting to note, however, that the community uses one-time levying to raise contingency funds.
Voluntary participation in community projects	Residents readily respond to calls for communal work. Respondents indicated this was largely due to fear of being penalized. One respondent observed that residents were not in the habit of taking initiatives, but had to be prompted.
Active role of women within the community	The four-member town committee has two men and women. The two women on the WATSAN are the most active when it comes to water issues and enforcing environmental cleanliness. The chief and village executives appear to be the only ones committed to sustaining the water facilities. According to all five respondents, residents refused to turn up for a meeting called by the chief to discuss outcomes of a pump training program organized in October by REDEP/Nyarkoa Foundation. Residents do participate in communal work and pay levies, but that is mainly because they fear the consequences for not doing so. One respondent spoke of community efforts in establishing a kindergarten.
Widespread understanding of the benefits of clean water	Findings indicated that only a small section of the community truly appreciates the benefits of a clean water facility, considering that many residents still fetched water from the stream. The two WATSAN members are certainly aware of the benefits and are doing their best to help the project succeed.
Other indicators	Strong commitment by WATSAN committee members and voluntary spirit that spurs them on in the face of widespread apathy. It is important to note it is the dedication of the two women WATSAN members that has kept the project going. They have persisted in spite of name-calling.

C-3 Awordo

My respondents in Awordo included two women and three men. The men included the 65-year-old Regent and two members of the town committee aged 32 and 48 (one of which was the secretary).

The women were the 18-year-old pump caretaker, and 60-year-old executive member of the town committee (who described herself as the overseer of the committee).

A traditional chief, who lives outside the community, formally governs Awordo. In his absence, the leaders of the five main families in the village serve as Regents. The exact date for the establishment of the village is unclear, but the consensus between the two elders I interviewed was that the earliest recollections about its history could be traced to an ancestor named Amankora. The two elders also told me that the earliest settlers were traders and farmers.

During my interview with the Regent, he stressed that the people of Awordo were not members of the Enyan ethnic group (the Fante sub-group that populates parts of the District and from which the District got its name). He said that Awordo was "independent" and that "it was the government that made [them] *Enyanfo* (part of the Enyan people)." This was in reference to the government's administrative demarcation of the District.

The current inhabitants of Awordo are still predominantly farmers and traders, with some supplementing their income with such activities as hairdressing, dressmaking and working as farm laborers.

C-3.1 Demonstrated ability to manage local projects

My respondents told me that Awordo has no formal projects besides the water facility, although they each made reference to the community's active involvement in the local school. In fact, the Regent stated that residents were instrumental in establishing the school, which now also serves several neighboring villages. He recounted how the community combined efforts to build the school, pointing out that none of the neighboring villages helped at the time. He said residents sacrificed the time they would otherwise have worked on their farms to build the school:

> We built the JSS [Junior high school] here. We bought the cement and built it ourselves.... So this community—Mesrenyame [nearby village] were right here, they didn't come [to help];

Amoanda, they were here, they never came. We did it ourselves. That year nobody cleared his or her farm. We started right after Christmas, we worked for a year.

While it is unlikely that the community financed the entire project, it is widely acknowledged within the District that the establishment of the school in Awordo was a community initiative, and that the community remains actively involved in its management.

Awordo currently has two hand pumps, both of which were operational at the time of fieldwork. The story of Awordo's management of its water facilities is an intriguing one. In 2010 when I conducted research in that community for my master's thesis (Sam, 2011), the village had a much more efficient management system than the other village in that study. At that time they had only one hand pump, there were strict rules concerning its use, and there was evidence of widespread compliance.

All this seemed to have changed by July 2012. When I visited the community during that period, a new hand pump had just been installed, but residents complained that it was not working properly. The monthly water levies had been discontinued, and people no longer observed the directive prohibiting young children from operating the hand pumps. What is more, there was disagreement between the WATSAN committee and the town committee about their respective mandates. By early 2013, residents found themselves with two broken hand pumps and no money on hand to repair them.

This prompted the village leaders to intervene by convening a community meeting. Before then, both disputing committees had been dissolved and a new one formed with oversight responsibilities for all community affairs. The 60-year-old female elder described the situation:

The children were mishandling the water [hand pump]. They would just let it flow to waste, so we decided to sell it.... We met community members, and pointed out that children were wasting the water, and that it would help if we started selling. At this point the pumps were broken down,

and we had spent all our money to repair them. We said if we sell it, we'd always have money saved for repairs.

The 65-year-old Regent threw more light on the process that led to the establishment of new rules to govern the community's water facilities. According to him, the elders first met with the new committee to discuss ways to improve the maintenance of the hand pumps. Afterwards, they called a community meeting to voice concern about the situation and suggest options for taking better care of the hand pumps. Among the suggestions were the introduction of water point payment in place of monthly levies and the appointment of two paid caretakers to collect payment:

> At first people just fetched the water "by heart" [with no restriction], so it broke down frequently. So we sat down, made an announcement, with the committee —*Nananom (*the elders*)* and the committee members met to discuss before we called the people and put it before them, all for the best…we planned afterwards to appoint someone to take care of the pumps…we selected two people, so now the water is being sold.

C-3.1a) Clearly defined, equitable and well-enforced rules governing local projects

In addition to selling water by the bucket, the community has revived the law prohibiting children younger than 10 years from operating the facilities. The hand pumps are also locked at designated times, thus ensuring that people do pay before gaining access and that children do not have unauthorized access.

The pump caretaker I interviewed told me that both pumps are locked at 7pm daily, and opened the next day at 7am. However, the caretakers do open the pumps for anyone who needs to fetch water before 7am, although the same cannot be done after 7pm.

According to the 60-year-old elder, not everyone was in favor of selling the water, but the majority was in support because of the high cost incurred for the repairs, and so the measure was adopted.

When I asked her why some residents were opposed to selling by the bucket, she said they feared people would not be interested in buying the water. According to her, those in favor of the proposal challenged this opinion, arguing that even if people refused to buy the water, the measure would still be useful because it would prevent its misuse. She concluded that the decision to sell the water has been advantageous:

> Some said people wouldn't buy it. We said even if people don't buy it, it'd be there, in good condition. So we started selling it. We spent a lot of money to repair it when it broke down, so we decided to sell it at all cost. Even if nobody buys it, it will remain there; it won't break down. …Selling it has been beneficial; no child can play with it.

C-3.1b) Effective conflict resolution mechanisms

Respondents said that Awordo has an established protocol for dealing with conflict. The Regent told me that elders intervene in conflict situations:

> If misunderstandings arise we the elders sit down, investigate to determine who is cheating whom [that is, who is in the wrong], and then we point it out to the guilty party.

When I asked the 18-year-old caretaker how conflicts arising from the water rules are addressed, she responded that the procedure is to "tell the committee members here to settle the issue."

C-3.1c) Monitoring

The implementers of the water project (REDEP and Nyarkoa Foundation) visit all project communities every three months to monitor the performance of the water facilities. This has been helpful in identifying problems and addressing them before they fester.

C-3.1d) Functionality of existing water facility

Both hand pumps in Awordo were working at the time I conducted fieldwork in September 2013.

C-3.1e) Diligence on pump maintenance and provisions for technical support

My respondents told me that village leaders are in charge of contacting the technician in the event that any of the pumps develops a fault: the leaders "call a technician to take a look at it. If the cost is more than our savings, the community contributes to top it up to repair it."

Later, the female elder I interviewed told me that when both pumps broke down in early 2013, they followed the same procedure: "We didn't have enough money to cover the repairs, so the men took on a weeding job [paid labor] to get some money, and we added what little we had to it so we could repair it."

It is worth pointing out also, that both newly appointed caretakers are women.

C-3.1f) Cleanliness of the pump area

Both pumps were clean. The two women who collect payments are also responsible for cleaning the pumps.

C-3.1g) Role of leadership in water project

The management of the water facilities was a joint effort between the traditional leadership and elected executives. The Regent told me that after a period of intermittent pump breakdowns, the elders met the village committee and discussed ways to resolve the situation. The 11-member town committee now supervises the water project facility, after the WATSAN committee was dissolved due to poor performance.

C-3.2 Financial management of local projects

As mentioned, water is sold by the bucket at 5 pesewas (2 cents) per 18-liter bucket. The caretakers are paid a third of all monthly proceeds from the water sales. According to my respondents, the caretakers render account to one of the committee members at the end of every month, who then deposits it into a bank account.

Even though respondents expressed confidence that the new financial arrangement was beneficial in helping them save for future repairs, the community was not able to show records to back this up. All attempts to inspect the bankbook proved futile, and none of my respondents seemed to know the exact amount that had been saved.

C-3.3 Voluntary participation in community projects

The Regent told me they get together every Tuesday to clean the entire village. He said this is a time-long tradition and attendance is mandatory. I also learned that community meetings are held every Tuesday. He explained Tuesday was selected because it is the only day of the week when residents take a break from their farms in observance of taboo. According to him, the routine is for anyone who anticipates a scheduling conflict to seek permission from the elders to excuse themselves from a meeting:

> We've told them anyone who needs to travel to inform us [the leaders]; you can ask permission from us; you could say you are not well and are going to the hospital, or that something came up and you need to travel, so you can be exempted from the meeting. And they follow it accordingly.

Although the residents do help clean the area around the two hand pumps when the need arises: "Sometimes we help out if we see there's too much work. Recently when it got weedy, the men cleared it all up and burned it, so the bushes are far from the area." (Regent)

I gathered from my respondents that the community had learned hard lessons from consecutive failure of both hand pumps, and have resolved to prevent a recurrence. Respondents were of the opinion

that residents were handling the hand pumps with responsibility. The elder told me she has observed that residents "take good care of them; they don't mishandle them."

It could be argued, however, that this positive attitude toward the pump is relatively new and came as a result of the problems that the community faced when both pumps broke down. Still, this shift in attitudes is commendable.

I also learned that the community has a high regard for education. For example, caretaker revealed that residents "help out when there's work to be done in the school. And when the school needs money, community members organize a "harvest" [fundraiser] to help out."

The elder, who never went to school, sounded excited when she shared her views of education. She said she values school so highly that she resolved to educate all her children: "School is good; I really like education. When I went to the Asanteman (Ashanti Region), I was really impressed. I said no child of mine would stay home." The Regent told me the village does not condone truancy, and that "Anyone who stays home is most likely sick."

C-3.4 Active role of women within the community

According to the respondents, there are women in the village leadership, and they play a central role in the community. Women are actively involved in decision-making concerning water facilities and other community issues. This became particularly evident during the interview with the Regent: when I requested to interview the officials in charge of the water project, he told me that I needed to speak to the woman who was in charge of the committee. This turned out to be the 60-year-old elder, who is also the deputy chair of the village committee and who spearheaded measures to improve the performance of the two water facilities. When I asked her what role the women in the community played concerning the water project, she responded: "We discussed the need to sell it and handle it in a responsible manner so that it will last longer for us."

She explained that women's role in managing the community's water project has evolved over time. According to her, when the hand pumps were first installed, the main role that women played was to take turns cleaning it. The cleaning schedule was determined by day of birth, so women born on Monday would do the cleaning every Monday, those born on Tuesday would clean on Tuesday, and so on. However, the caretakers now do the cleaning:

> Once the well was drilled the original arrangement was for those [women] born on Monday, Tuesday and so on, to clean the area every day. So that included all the young girls here.... But once it broke down, we decided that since we spent money to repair it, we would employ someone to sell it.

She said there are other women leaders in the community; for example, each of the five clans that rule the village has a queen mother, and 3 out of the 11-member village committee are women, two of them serving in executive capacities as deputy chair and treasurer. Also, two women have been trained to perform minor repairs on the hand pumps.

C-3.5 Widespread understanding of the benefits of clean water

Respondents appeared to have a clear appreciation for the benefits of clean water. For example, the Regent and the elder both told me they believed water from the hand pumps was healthier than the stream. They each acknowledged that the hand pumps were sent to their community in response to an important need:

> You know we have Ochi [stream] just here. It's so close by this time you could make about 8 trips there and back, so there would have been no reason for them [the government] to drill a well for us; they would have just left us to use our water [stream]. But they brought this water [well/pump] because people complained of sickness—stomach pains and the rest. You feel good

after drinking it, even if you haven't had anything else. So we don't joke with it—with anything concerning it.

We've realized that the stream can even give us a disease. There are some neighboring villages that used water from a stationary surface source; they used to suffer from a disease called guinea worm a lot; you'd see on their legs, with some creatures inside it. So some used to come collect some of this water here [the pump] to drink.

However, as one of my respondents told me, some residents continue to use the stream for other purposes:

They do go to Ochi, but not as often as they go to the pump.... Some use Ochi for laundry and cooking, and drink from the pump. Others do not go to Ochi at all; they use the pump for laundry, cooking and drinking.

Some respondents also intimated that those who truly appreciate the health benefits of clean water are willing to make the sacrifices needed to acquire it. For example, the Regent suggested that one does not have to be wealthy to afford clean water. Rather, if considered a priority, an individual would make every effort to obtain clean water. When I asked him how the community addresses situations where some residents could not afford to buy the water being sold, he suggested that there was no such thing as a "poor" person in the community:

Oh, everyone has money here.... Yes, God always gives guidance. Take me for example; I don't have a lot of money on me, but God has given me the brain to find a way to eat. Yes, so God will give them the brain to find a way to buy the water.

C-3.6 Other Indicators

One remarkable characteristic identified in Awordo is management flexibility; the willingness and ability to revise management techniques where necessary. Although the terms of the water project (agreement with NF/REDEP) require the formation of a WATSAN committee to manage the facilities, tensions between the WATSAN and village committees and the resulting stalemate led village leaders to dissolve both committees. In their place, the community formed an 11-member village committee that now oversees all village issues, including the water facility.

C-3.7 Summary

As discussed, the people of Awordo appear to have learned important lessons about the need to keep their water facilities in good working condition. Their leaders have demonstrated competence in straightening out situations that threatened to derail the community, and the apparent harmony between traditional leaders and elected officials is laudable. However, the absence of accountability raises doubts about the true ability of the community to finance future repairs and achieve the objective of continuous water supply. Table C-3 summarizes findings in Awordo.

Table C-3. Summary of findings in Awordo

Variable	Findings in Awordo
Efficient management of local projects	Reports about past efforts in spearheading the construction of a community Junior High School and continued active involvement in school management provide evidence of efficient management of other local projects. For the water project, residents have clearly established rules that are enforced through pump closure and on-site collection of water fees.
Financial management of local projects	In Awordo, the water project is the only one that requires financial management by residents. After the failure of monthly payment system, the community has now settled on a pay-per-bucket system, where each person pays 5 pesewas for each 18-liter bucket collected. To enforce this, the community has established lock times for both pumps, and employed two caretakers to collect payments and clean the facilities. However, repeated efforts to locate financial records of these payments proved futile.
Widespread participation in community projects	As mentioned, Awordo has a history of active involvement in the establishment and maintenance of the community school. Further evidence of widespread participation in community efforts include weekly joint cleaning efforts and recruitment of two paid pump caretakers.
Role of women within community	Three out of the eleven members of the newly constituted village committee are women. Two of them serve in executive capacities as deputy chair and treasurer. Both caretakers employed to collect money and clean the pump area are women, and two women have been trained to perform minor repairs on the hand pumps.
Positive attitudes toward local projects	Active involvement in community school and sustained efforts in managing the water project point to an overall positive attitude by residents toward local projects.
Widespread understanding of the benefits of a water facility	Residents generally understand that safe water provides protection against water-borne diseases, but some people still patronize the stream for various reasons.
Other indicators	One remarkable characteristic identified in Awordo is management flexibility; the willingness and ability to revise management techniques where necessary. Although the terms of the water project requires the formation of a WATSAN to manage the facilities, tensions between the WATSAN and village committees and the resulting stalemate led village leaders to resolve both committees. In their place, the community formed an 11-member village committee that now oversees all village issues, including the water project.

C-4 Badukrom

Badukrom has a population of 148 and is located along the paved main road, offering residents much needed mobility to commercial centers within the district. Two women, who were appointed heads after the death of the traditional chief in 2012, lead the village. There is no school in the community, and the two closest ones are either three kilometers west off the main road, or a kilometer north across the busy road. Given the long distance and concerns about the busy road, some parents prefer to transport their children to schools further away from the village. Fortunately, a nongovernmental organization

(NGO) is building a structure that will serve as pre-school with possibilities for expanding to a primary school.

My respondents in Badukrom included two men and three women. The two men were an elder and a pump technician (trainee), while the women were the two leaders (headwomen) and the second pump technician (trainee). The only handpump in the village was installed in the early nineties and is in good working condition. Before its installation, residents fetched water from the Ochi River, which is about three kilometers away.

C-4.1 Demonstrated ability to manage local projects

The community currently has two active projects; managing the water facility and construction of the school building.

C-4.1a) Clearly defined, equitable and well-enforced rules governing local projects

According to respondents, the rules governing the use of the water facility include a fixed water fee and strict closure times.

I gathered from my respondents that these measures had been adopted in a participatory manner, and after a number of considerations had been taken into account. Among factors considered were feasibility of the rules, household size, and fairness:

> Before we started selling this [water], we called a meeting right here [under the big tree] and discussed it. Initially, we planned that each family would pay one cedi a month, but it didn't work, so we decided to collect money by the bucket that each person fetches. We felt it wasn't fair for a large household to pay only one cedi a month, while someone who lived alone or had only two people in the house paid the same. Those people weren't happy, so we had to abandon that plan. So now even if there are several people within a household, everyone brings their money to pay for the water, so that brings more income. So that's how it was decided. *(Man, 35)*

C-4.1b) Responsive leadership

One of the head women explained that the community, at some point, temporarily halted the sale of water in reciprocation for residents' support toward the school project.

C-4.1c) Effective conflict resolution mechanisms

I learned from my respondents that the village had a "no excuse" policy toward the collection of water fees. When asked if any resident would be exempt from payment under any circumstances, one of them responded: "…you simply don't fetch if don't have money." Another reaffirmed: "No one can ever say they'll fetch and not pay. If you don't want to pay, you go to Ochi [the stream]. She proceeded to give a vivid description of a typical response when someone attempts to evade payment:

> There are times when some people try to sneak by and fetch water without paying. They then get angry when you catch them, but we make them pay anyway. *(Woman, 56)*

C-4.1d) Monitoring

The community has adopted a customized approach toward the management of its water project. Instead of the standard five-member WATSAN committee, the village leadership and the two residents who received training as pump caretakers are jointly managing it. This team oversees minor repairs, supervises cleaning, and enforces water fees payment and pump closure.

C-4.1e) Functionality of existing water facility

The pump is in good working condition. The two caretakers told me they regularly check for loose bolts or stiff links.

C-4.1f) Diligence on pump maintenance and provisions for technical support

One of the pump caretakers (male) has prior technical knowledge and is able to perform minor repairs/maintenance. In addition, the village is located along the main road network, offering residents easier access to technical support when needed.

C-4.1g) Cleanliness of the pump area

The pump area was clean. Respondents told me women take turns cleaning the surroundings. Meanwhile, the men are planning to build a wall around the pump.

C-4.1h) Role of leadership in water project

The two headwomen have extended their influence into managing the water project.

C-4.2 Financial management of local projects

Water fees are charged at the water point. Residents pay by the bucket, and have access to the key should they need to fetch water during closure. An inspection of the community bankbook showed that the initial deposit of GH¢30 ($15) in August 2009 has grown to GH¢296 ($146). The last deposit was made in March 2013.

The community is mindful of its vulnerabilities, and is therefore taking steps to avoid falling into a situation where the pump breaks down with no money to repair it. In fact, one respondent told me, "We are a small community, so unless we sell the water and save the money, we'll be in trouble when the pump breaks down." *(Man, 35)*

Another respondent confirmed: "…because we have a bankbook, we save whatever we collect so there will be money to repair it if it breaks down." *(Woman, 56)*

C-4.3 Voluntary participation in community projects

Unlike other communities where the lock on the pump is often broken, residents in Badukrom observe the rules governing the pump. According to respondents, both male and female residents are also

actively involved in the school project, with men working on the actual construction and women supplying water and cooking for the workers.

One respondent threw light on the zeal that had driven the community to support the school construction project. He revealed that his own lack of education, and the opportunities closed to him as a result, made him dedicated to supporting efforts to bring a school to his community:

> I had no education, and I feel the pinch. If I had known the advantages earlier on, I wouldn't have stopped schooling. I would be educated now and have a better standing....When the school project started, I was very active; I built the [cement] blocks, laid the foundation. When things go well it honors the village and we all benefit. So we all like it.

He added that having a local school would also reduce the financial strain on parents who currently have to transport their wards to schools far from the community:

> Once it opens, people who transport their children to school will no longer have to do that. I hear those at the top [up the hill] speaking, and I hear from parents whose children go to school farther away; the cost of transporting their children to schools saps their finances, and it would really save them money if they didn't have to anymore. They would be really happy when the school opens. *(Man, 35)*

C-4.4 Active role of women within the community

Respondents indicated that women hold as much influence in the community as men do. When I asked whether women share opinions during meetings, one respondent told me:

> Some of the women can speak; whoever has something to say does so. If someone has an idea, they share it. If we don't agree, we all discuss it. *(Man, 35)*

He acknowledged that community development involves shared inputs from both men and women:

> …Both men and women speak their minds. You can't build a community with only one person. Whoever has something to say raises their hand and says it. Once we call a meeting, everyone can share his or her opinion. If it's not a good idea, we just won't take it. *(Man, 35)*

C-4.5 Widespread understanding of the benefits of clean water

According to respondents, residents value the convenience offered by the hand pump, as well as its health benefits. They recognized that it was a marked improvement over past options:

> There's no other water source for miles around here; we'll have to go to Obuom [nearest outlet for the Ochi River] to fetch water. There used to be a pond here that was filthy; bits from the bamboo trees would just fall into it. It looked so nasty you'd hate to see it if they gave it to you to drink, so it wasn't good. But this water tastes good. At first it tasted salty, but after fetching it for some time it's fine; now everyone can use it. At first it never lathered when you washed clothes with it; it would turn buckets rusty when you filled them with water. But that's all gone now because we kept fetching it; they told us it would improve as we fetched it, and truly, it did. *(Man, 35)*

> Back when we drank water from the stream, lots of people got guinea worm infection. So, the white people came here and made a note that we should get a water system. It wasn't long afterwards that they finally brought it. *(Woman, 56)*

In the opinion of one respondent, something as important as water must be a priority spending for all residents:

> As for the water, even if you don't have money you'll fetch it. Water is something important, so there's no way you can't get 5 pesewas to fetch one bucket [18 liters] to bathe with or use for house chores. *(Man, 35)*

C-4.6 Other indicators: New insights gained from pump training workshop

Besides gaining the skill to perform minor repairs on the pump, the caretakers also signaled that the training had alerted them to potential frauds. One of them elaborated:

> For example, I can now detect if any technician we call in tries to cheat us. Because of the things they taught us, I could challenge him if he makes any false claims, as in saying some part [of the pump] is out of order, when it really isn't. *(Man, 35)*

This is worth noting, because many villages in the district have fallen victim to unscrupulous pump mechanics who only seemed interested in separating residents from their money.

The positive performance of the water project in Badukrom reveals an interesting pattern: Armed with an effective leadership structure, the community has been able to galvanize residents' appreciation for the convenience and health benefits offered by the hand pump into a successful project.

C-4.7 Summary

The performance of the project in Badukrom provides strong evidence that a combination of variables influence the outcomes of rural water supply projects. In the case of Badukrom, it took effective women leaders to guide residents into formulating rules governing the use of the water facility, and residents with a strong sense of responsibility who appreciation of the convenience and health benefits of clean water to ensure compliance and uphold their financial obligations. Table C-4 summarizes findings in Badukrom.

Table C-4. Summary of findings in Badukrom

Variable	Findings in Badukrom
1. Demonstrated ability to manage local projects	Badukrom has one hand pump, which is kept under lock and opened early morning and late afternoon. The community has donated land for the construction of a basic school being financed by a nonprofit, and also provides labor for the work. The village has established clear rules to manage its water facility in the form of stipulated fees and strict lock times. Residents' eagerness in providing coordinated support for the school project is also commendable
2. Financial management of local projects	Waters fees are charged at the water point. Residents pay by the bucket, and have access to the key should they need to fetch water during closure. Badukrom was the only community that provided evidence of savings by showing its bankbook. The village has demonstrated remarkable financial commitment and transparency by instituting a strict payment regime and opening its bankbook for scrutiny.
3. Voluntary participation in community projects	Unlike other communities where the lock on the pump lock is often broken, residents in Badukrom observe the rules governing the pump. According to respondents, both male and female residents are actively involved in the school project, with men assisting in the actual construction and women supplying water and cooking for the workers. The woman in charge of the pump explained that the community, at some point, temporarily halted the sale of water in reciprocation for residents' efforts toward the school project. Residents have shown resourcefulness in providing coordinated support for the school project and consistency in managing their water project.
4. Active role of women within community	Two headwomen are in charge of the day-to-day village administration. One of them has direct oversight over the pump; she collects the water fees, keeps the hand pump under lock, and also keeps the bankbook. The head women's ability to not only provide leadership for the community, but also broaden their influence into effectively managing the water project is particularly laudable.
5. Widespread understanding of the benefits of clean water	Respondents stated that they appreciated the convenience and health benefits of the water pump. Findings showed that residents appreciate the advantages of convenient access to clean water and are dedicated to its maintenance.
6. Other indicators	a) Unexpected impact of training program; trainees have become wise to potential fraudsters. b) Effective leadership and a strong incentive for sustaining the water facility stemming from appreciation of the convenience and health benefits of the water facility have contributed to a successful water project in Badukrom. The ability to extend political leadership into managing the water project is remarkable, as is the heightened sense of awareness among the pump caretakers.

C-5 Budukwaa

Budukwaa has an estimated population of 358 and is located in a thickly forested, lowland region. It is named after a farmer who settled in what was then a forest. As a reference to the pervasive water

scarcity in the area, the founder is said to have coined the adage *" "nsu kitowa odo a, oso egur."* To wit, when a small amount of water gets heated, it's enough for a shower bath. The implication is that when you heat a cup of water very hot, you can't just pour it over you; you'll have to splash in bits. It is a reference to the chronic water scarcity in the area, which make the existence of the water facility so critical.

The story goes that when he cleared the forest, there was no water around in the area besides seasonal ponds. So during the harmattan when water became really scarce, he and his family would heat a small pail of water and share it among themselves. Being very hot, all it took was a few splashes to get bathed.

Budukwaa has a traditional chief who resides outside the community, so a regent has been appointed in his absence. The regent leads the community with assistance of a counsel of elders and a four-member town committee.

Respondents in Budukwaa included three women and two men. The three women were all members of the WATSAN committee, and two were pump technicians who had received training to conduct minor repairs. One of the men was the regent, and the other was a member of the town committee.

The well was drilled and fitted with a hand pump in 2005. It was provided by a food-processing company operating in the area in response to a request by the community. The company also donated a preschool/nursery building, with the veranda serving as a community center. Figure C1 shows a food vendor selling to children on their way to school. The community manages both facilities.

Figure C1. The veranda of the nursery school, showing typical morning routines in Budukwaa: children buy food from a vendor before setting out for school

There is no elementary school in the community, and the nearest school is 2.5 kilometers away. That situation prompted residents to request a preschool building from the company. According to one of my respondents, children have difficulty attending school when the roads flood after heavy rains. They have hopes to expand the nursery into an elementary school.

C-5.1 Demonstrated ability to manage local projects

The village has met some but not all of the criteria regarding their ability to manage local projects. Budukwaa has one handpump and an open well that only produces water in the rainy season. The chief, elders and village officials jointly manage all community projects. In the case of the water facility, the WATSAN committee works with this leadership team.

C-5.1a) Clearly defined, equitable and well-enforced rules governing local projects

The rules concerning the use of the water facility include monthly household levies, which are currently not being enforced (due to mutual agreement for suspension), and a ban on wearing shoes on the pump platform to in the interest of cleanliness. According to one respondent, the latter is difficult to enforce because it requires the constant vigilance of the pump caretakers, which is not always possible.

C-5.1b) Effective conflict resolution mechanisms

The community has established a chain of command in handling problems with the water facility: the WATSAN committee informs the regent, who then calls the elders and the town committee to discuss it and decide on a plan of action.

People who behave in an inappropriate manner are summoned before the chief and elders. As one respondent explained, inappropriate conduct includes verbal abuse of individuals dispatched to collect levies:

> Let's say someone has spoken inappropriately to the gentleman who goes to collect the money. We consider that such inappropriate talk is actually directed toward the chief of this village. So we have to put that before the community for the people to call the person who made those utterances. (*Man, 48)*

According to respondents, resolving issues concerning the enforcement of rules (i.e. payment of water levy and the ban on footwear on the platform) has been challenging. On the question of water levies, there was a suggestion to publicly shame defaulters, but that did not catch on because it was not acceptable to the community:

> Our understanding is that whenever the pump breaks down it costs money to repair it. So, we do understand and pay, but a few among us are reluctant to pay. It came to a point that our elder who's passed on proposed that we publicly name those individuals who have refused to pay, you see. So for example, they'd say "auntie Mercy has refused to pay," mentioning her name in public for everyone to know. But the fact is we can't expose people like that, because we're one people; we can only keep encouraging people to pay. (*Woman, 52)*

On the issue of footwear, one respondent admitted that it was difficult to enforce because no one is stationed at the pump site to do so: "If I am there, I can enforce it. As it is, by the time you get there, they would be done and gone, so you can't say anything." (*Woman, 35)*

C-5.1c) Monitoring

As mentioned, the management of the water facility requires teamwork between village officials and the WATSAN committee. The pump caretakers regularly check for loose bolts, and are expected to report all concerns to the chief and village executives for action.

C-5.1d) Functionality, maintenance and cleanliness of the water facility

The pump was functional at the time fieldwork was done in summer 2013. The pump caretakers ensure that the platform and surroundings are clean. A member of the town committee is responsible for bringing in a repair technician whenever the pump breaks down.

C-5.1e) Role of leadership in water project

As mentioned, the regent and his team are active co-managers in the water project.

C-5.2 Financial management of local projects

In spite of having an established financial policy to govern the water facility, Budukwaa failed to meet all the criteria for an efficient financial management.

The community instituted monthly household levies of 1 Ghana Cedi (.30 USD), but that has been temporarily suspended. According to one official, this was in sensitivity to difficult financial straits being faced by residents due to poor harvest:

> Each household was supposed to pay one cedi every month. But over here, work doesn't generate much income during the harmattan (dry) season. Take a farmer whose crops aren't yielding because of the dry season. Such a person has no money. *(Man, 48)*

When I asked whether he was certain people really could not afford to pay the levy, he explained:

> The fact is, we live in this village, and we know the livelihoods here and how things affect people's income. And we know that once the harmattan sets in hardships arise because there is no rain. When you go to collect the money—people wish they could pay, but because they are unable to harvest any crops from their farms. When you go to collect the money, you can see that they're not forthcoming.

Another respondent echoed this sentiment:

> Our crops didn't yield much this year, so some people don't even have maize. The rains didn't come, so the maize didn't grow. There are some people—excuse me to say—who don't even have maize in this village (*Woman. 60)*

The community provided proof of bank savings, showing a balance of 54 Ghana Cedis (16 USD). The bankbook showed that there had been three deposits into the community account, the initial 10 Ghana Cedis opening balance, and two further deposits of 20 and 24 Ghana Cedis. The last deposit was made on November 7, 2012.

It was apparent that the community presently had limited resources to address future pump breakdowns, but are hoping to be able to start saving again:

> We have decided that if the machine breaks down, we should have some money to go bring a technician— even if the people who went to training will do it themselves—we'll need some money for parts. So we've announced a meeting to discuss that. (*Man, 74)*

However, they seemed to have solved past breakdowns through emergency fundraisers to pay for repairs:

> Right now when it breaks down, the town committee—if we have some community funds—will bring someone to fix it. If there's no money they levy the community, sometimes 2 Ghana Cedis.... We residents use the water, so if it breaks down we all have to contribute to repair it. (*Woman, 52)*

Another respondent talked about a time when the hand pump actually broke down. Although they had initially tried to contact the implementers of the water program (NF/REDEP) to assist in fixing it, they ended up footing the bill themselves, because the facility was urgently needed:

> Recently, it developed a fault. When it happened, we called on our elders in Abaasa [REDEP] to repair it for us. At that time, we had a funeral in this village and we required water for that. But we didn't go soon enough, and it got really close to the funeral. So, the community paid for the repairs; we spent 170 Ghana Cedis. We bought the needed spare part and fixed it. Because the water helps the community, we bore the cost of the repairs. (*Man, 48)*

Another option that was considered is selling the water to residents from a neighboring village, but this has not been possible because of the "salty" taste of the water, which residents find unpleasant:

> If the water tasted good, we should have appointed someone to stay there and sell it—one person can do that. But right now the water does not taste good enough to sell—everyone fetches free of charge. *(Woman, 52)*

On the other hand, the community had been able to employ and pay a nursery teacher for a year, until the government took over.

C-5.3 Voluntary participation in community projects

It was clear from my respondents that residents had a keen commitment to both the water facility and the school project. Speaking about prevailing attitudes toward the water facility, one respondent stated: "We understand that it's our responsibility to maintain the water [hand pump]."

Past efforts at acquiring potable water and existing arrangements, such as an active WATSAN committee, point to a significant positive attitude toward the community water facility. One respondent described at great length the circumstances that prompted a request for a borehole fitted with handpump, and a preschool facility:

> Our water situation was not good, because when harmattan hit we travelled longs distance—during harmattan all the water around here dries up—so we would travel about 4 miles [6 kilometers] to a village called Nkodwo—you know, near Eyiakrom—4 miles to fetch water.
>
> Because of that, we informed NGO—the pineapple company that our water situation was not good. They themselves came to see the kind of water we had in this community, and realized it was not water that people should fetch and use for anything. *(Man, 48)*

The village also took the initiative to establish a kindergarten since the closest school is about 2.5 kilometers away:

> Matters concerning education are very important to us in this community. There's no school here; children have to walk a mile and a half [~2.4 kilometers] to Nsawadze. Sometimes when the road floods children are not able to walk to the school.

> After the NGO built the nursery school for us, we paid the young man who was teaching the young children. We continued to pay him until we sent a request to the government for teachers. The government heeded the community's request, and we no longer pay the teacher; the government pays the teacher who comes to teach. *(Man, 48)*

According to respondents, the community does not have regularly scheduled meetings, but rather meet when an issue arises that merits discussion:

> In this village, we have different types of meetings; we have the "community meeting;" there are times when something happens that the wider community needs to be informed about. We wait for people to return from their farms, and then we play the gong for a gathering, and inform them about the issue. Besides that, we hold gatherings when something comes up concerning the collection of community levies, sometimes concerning the water.

However, meeting times appear to have been arbitrarily established; one executive said once the call is made, residents are expected to stop all activities and heed the call. However, another respondent intimated that the meeting times are not always convenient for women as explained by one respondent:

> It used to happen; especially, we women would be busy with chores and so wouldn't come to the meeting immediately. Our elder [regent] was displeased with us about that; he told us we should stop whatever we're doing and go listen to what he has to tell us. It could be that a guest was meeting us, and they might have other stops to make…. it was mostly we women; some arrive promptly, others really delay and arrive in the middle of discussions. *(Woman 52).*

She said people who were late to meetings were sometimes threatened with fines, though this was never enforced:

> Sometimes when people fail to response promptly to meeting calls from the chief—or an elder who returned from a trip—they are fined about 2 Ghana Cedis. But in actual fact it's an admonition so we know it's not acceptable—they say it, but they don't collect.

The village leadership showed sensitivity to financial difficulties faced by residents and temporarily halted payment of water levies.

C-5.4 Active role of women within the community

Women appear to have limited power and influence in the wider community. The members of the 4-member town committee are all men. However, three out of the five-member WATSAN committee are women, and they are more active than the men.

Interestingly, when I asked one male respondent what role women played in the water project, he immediately cited women's duties in cleaning the hand pump, although two women had received training in pump repairs: "The role they've been playing concerning the pump is that every Friday they beat the gong for the women to go clean the pump area, so it doesn't get dirty." *Man, 48*

The other male respondent however, did acknowledge the training the women had received, and expected that they could perform minor repairs when the time came. One of the trainees (and pump caretaker) was indeed confident that the training had prepared her to not only perform minor repairs, but to save the community from unscrupulous technicians:

> We were selected to take care of the pump, so we don't get cheated. We've been taught to detect whether parts are truly broken, and what they actually cost, such as when something doesn't cost 100 Ghana Cedis but more likely 20 Ghana Cedis —that's what we went to learn.

It is worth noting that this woman was not part of the original WATSAN committee. Her involvement started when she was nominated to attend the pump training workshop, and has been actively working on the facility since then. She explained her motivation:

> I like to involve myself in things. This morning, for instance, I went to clean the pump—I scrubbed the borehole and drained the water around it. (*Woman, 52)*

Much as she enjoys taking care of the facility, she wishes to encourage others in the community to be a part of it: "I have told them that it's not a job for one person; everyone can also clean the area—every woman can clean the water [area]." In the meantime, she has taken up such tasks as painting the hand pump when it got rusty.

Figure C2. Budukwaa handpump. One of the pump caretakers did the paint job to cover the rust

One woman respondent believes the absence of women on the town committee reflects the belief in its leadership that "women are of no consequence." She said she had a lot to contribute if she were a member, but it has not been possible because women are not informed:

> The fact is that, when such decisions are being made, the men do it among themselves. They should have included women, but perhaps they think women's views are of no consequence. *(Woman, 52)*

She believes women should have been part of the committee, but they were not invited to join because one person in the community "doesn't want women to be a part of anything. " She was doubtful whether it would make any difference if she volunteered to serve on the committee without invitation: "If only you'll hear of it. If they open up, others can share their views."

Another female respondent confirmed that it had been briefly considered to appoint women to the committee, but had two theories about why it did not materialize. The first theory was that initial attempts to include women were not followed through, given the difficult nature of the job. The second was that women were generally too outspoken to handle the more trying aspects of committee work:

> After they were selected, there was no follow-up. As you know, the work is difficult; the men will just have to do it. Working on the committee—you know men aren't like us. Let's say you're going to collect money. If someone says something offensive, they won't respond, but if a woman were to hear it, she'd speak her mind.... you know men don't pay much attention to things like that, so they just ignore it. But a woman would definitely talk back! *(Woman, 35)*

C-5.5 Widespread understanding of the benefits of clean water

According to respondents, the community considers the water facility to be essential because it solved their chronic water problems and is also more convenient:

> You see, the borehole is closer to town. So when someone returns late from the farm, they don't have to worry about where to get water. They don't have to walk through the bush to fetch water from the (shallow, hand dug) well. It's faster than walking through the bush to the well or the stream. (*Man, 48)*

They also consider it cleaner than the stream:

> In terms of health, consider the stream and the way that we fetch water from it. You'll have to walk right into it. Never mind that your feet are dirty, or that you stepped in feces before going in. You'll end up tracking all that into the water. But the borehole isn't exposed to feet; it's from deep within the earth, and so it's much more healthier than the stream. (*Man, 48)*

However, some complained about the poor taste of the water, and said they collected rainwater and fetched water from the open well whenever available. There was a consensus, though, that the hand pump offers the most stable supply of water, all year round:

> It's very important to us! We suffered a lot when it broke recently—we suffered very much. There was an upcoming funeral and there was no water, so we quickly collected some money to repair it. There were no rains at the time, so that's all we had. We really used it! That's all we use for cooking, washing, doing everything in the house. (*Woman, 35)*

C-5.6 Other indicators: Impact of training on women's leadership within community:

The pump training workshop has encouraged women to take a more active part in managing the community water facility, in direct opposition to the tendency by village executives to exclude women in decision-making.

C-5.7 Summary

Budukwaa appears to have a well-coordinated governance system where the regent, village officials and WATSAN team work together to ensure success of community projects. Although the community is currently not saving money for future repairs, they seem to have an arrangement that has worked for them in the past, namely levying residents when a break down occurs. It could be argued that this tendency to postpone saving until a crisis occurs makes the community more vulnerable to water

shortage. It also reveals a surprising lack of foresight in a community with a record of water problems. Similarly, it raises questions about the community's level of commitment toward sustaining their water facility: If residents are capable of contributing such significant amounts of money under short notice, couldn't they be saving now so there is less pressure on them during a crisis?

Perhaps it all comes down to what one of my respondents said: community members understand their own situation best. Hence any scrutiny into their project performance must take that into account and acknowledge the decisions made as a result of those situations. Perhaps in the end, what really does matter is that their water facility remains in good working condition.

Women's involvement in overall community governance seems minimal; most of their responsibilities are focused on the physical maintenance of the pump. Yet this role is significant, because it gives women direct control over the maintenance of the facility. The pump training program has especially being instrumental in that regard.

Table C-5. Summary of findings in Budukwaa

Variable	Findings in Budukwaa
1. Demonstrated ability to manage local projects	Budukwaa has one hand pump and an open well that only produces water in the rainy season. A food-processing company operating in the area provided the hand pump in 2005, upon request from the community. The community is also managing a preschool that was built by the same company that installed the hand pump. The chief, elders and village officials jointly manage all community projects. In the case of the water project, WATSAN committee works with this leadership team. The community has established a chain of command in handling problems with the water facility: the WATSAN committee informs the regent, who then calls the elders and the town committee. After deliberations, the leaders call in a technician to repair it. The rules concerning the use of the water facility include monthly household levies, which are currently not being enforced, and a ban on wearing shoes on the pump platform so as to prevent pollution. According to one respondent, the latter is difficult to enforce because it requires the constant vigilance of the pump caretakers, which is not always possible. The community has been managing the preschool effectively, shown diligence in repairing the hand pump when it broke down, and exhibited remarkable teamwork between the village leadership and the WATSAN officials. However, to receive full points all laws must be fully enforceable and effective, which is not the case here.
2. Financial management of local projects	The community has instituted monthly household levies, but that has been temporarily suspended. According to o ne official who was interviewed, this was in sensitivity to difficult financial straits being faced by residents due to poor harvest. The community provided proof of bank savings, showing a balance of 54 Ghana Cedis (16 US Dollars). The bankbook showed that there had been three deposits into the community account, the initial 10 Ghana Cedis opening balance, and two further deposits of 20 and 24 Ghana Cedis. The last deposit was made on November 7, 2012. It was apparent that the community had limited readiness to address future pump breakdowns. However, they seemed to have solved past breakdowns through emergency fundraisers to pay for repairs. On the other hand, the community had employed a nursery teacher for a year, until the government took over.

Table C-5. Summary of findings in Budukwaa (continued)

Variable	Findings in Budukwaa
1. Demonstrated ability to manage local projects	Budukwaa has one hand pump and an open well that only produces water in the rainy season. A food-processing company operating in the area provided the hand pump in 2005, upon request from the community. The community is also managing a preschool that was built by the same company that installed the hand pump. The chief, elders and village officials jointly manage all community projects. In the case of the water project, WATSAN committee works with this leadership team. The community has established a chain of command in handling problems with the water facility: the WATSAN committee informs the regent, who then calls the elders and the town committee. After deliberations, the leaders call in a technician to repair it. The rules concerning the use of the water facility include monthly household levies, which are currently not being enforced, and a ban on wearing shoes on the pump platform so as to prevent pollution. According to one respondent, the latter is difficult to enforce because it requires the constant vigilance of the pump caretakers, which is not always possible. The community has been managing the preschool effectively, shown diligence in repairing the hand pump when it broke down, and exhibited remarkable teamwork between the village leadership and the WATSAN officials. However, to receive full points all laws must be fully enforceable and effective, which is not the case here.
2. Financial management of local projects	The community has instituted monthly household levies, but that has been temporarily suspended. According to o ne official who was interviewed, this was in sensitivity to difficult financial straits being faced by residents due to poor harvest. The community provided proof of bank savings, showing a balance of 54 Ghana Cedis (16 US Dollars). The bankbook showed that there had been three deposits into the community account, the initial 10 Ghana Cedis opening balance, and two further deposits of 20 and 24 Ghana Cedis. The last deposit was made on November 7, 2012. It was apparent that the community had limited readiness to address future pump breakdowns. However, they seemed to have solved past breakdowns through emergency fundraisers to pay for repairs. On the other hand, the community had employed a nursery teacher for a year, until the government took over.

C-6 Etsii Abeka

Etsii Abeka is a farming community with a population of about 492. According to one elder, it was initially the seasonal camp for a few farmers who hailed from Etsii Sonkwaa, a larger community. With time, more farmers came to spend more time on their farms and it grew into a settlement and expanded. The community currently hosts an elementary school that serves three neighboring villages. Like most of the other study villages, a regent rules in place of the traditional chief, who resides outside the community.

My respondents in Etsii Abeka included three men and two women, all serving in leadership capacities in the community; two were traditional leaders, one a member of the town committee, and the two others were members of the WATSAN committee.

There are two handpumps in the community, both installed by the government in 1982. Before then, the only water source was an outlet of the Ochi-Amissah River, which respondents say is about 1.6 kilometers away.

The picture below shows the two handpumps in Etsii Abeka.

Figure C3. The two handpumps in Etsii Abeka

C-6.1 Demonstrated ability to manage local projects

The only venture currently underway in Etsii Abeka is managing the two water facilities. Regulations governing the use of the facilities are the payment of monthly water levies and cleaning implemented by women. However, neither of these regulations is being fully enforced.

C-6.1a) Clearly defined, equitable and well-enforced rules governing local projects

According to respondents, earlier efforts to sell water by the bucket failed, but monthly water levies have now been introduced. However, the established rules governing the water facility were not being observed. For example, women were supposed to set up a schedule to clean the pump area, but this

was not enforced and there were no penalties for refusal to clean. The protocol for handling people who refuse to pay the water levy was to apply constant pressure and summon them to the chief/regent for questioning, but this was not effective in encouraging compliance:

> The last time we went round to collect, some refused to pay. We've referred the matter to the [town] committee. They haven't called them yet to answer. What happens is they are summoned by *Nana* to explain why they're refusing to pay for the pipe that serves the entire community. (*Man, 35)*

> If you say you won't pay, we'll use whatever means possible to retrieve it... The person collecting the money will come morning, noon and evening, so you would end up paying. (*Woman, 47)*

It should be noted that residents in study villages commonly refer to the handpumps as either "pipe" or "the water," to differentiate it from Ochi.

C-6.1b) Effective conflict resolution mechanisms

When I asked if the community had established sanctions for dealing with residents who refuse to comply with the directive, one executive responded: "We haven't established anything like that; they'll just call you before the community and collect it from you." (*Man, 35)*

C-6.1c) Monitoring

The community has a WATSAN committee that oversees the two water facilities. They report all faults to the town committee, who subsequently inform the regent and the elders. The pump technicians regularly check the handpumps, tightening lose bolts and watching for first signs of a problem. The WATSAN treasurer (also a trainee) had also taken to cleaning the facilities since the other women have failed to do so.

C-6.1d) Functionality, maintenance and cleanliness of the water facility

Both handpumps were in good working condition at the time of fieldwork in summer 2013. However, neither pumps looked particularly clean on inspection: The handpumps and parts of the surrounding areas were muddy, weedy and strewn with litter.

C-6.1e) Role of leadership in water project

The community appears to have a well-established leadership team consisting of the Town Council, the regent and elders, and the WATSAN committee. Indeed, one respondent presented evidence of the teamwork involved in managing the water facilities:

> As for the elders in this village, we all help; when the pipe breaks down, we all come together to seek a solution. We work with the WATSAN to get it repaired. (*Woman, 47)*

However, there was little evidence of coordination among the leaders as far as managing the water facilities was concerned.

C-6.2 Financial management of local projects

According to respondents, each adult is expected to pay 50 pesewas per month as standard water levy. Records showed the last levies were collected on October 15, 2013 (a month before these interviews were conducted). They also said that when one handpump broke down earlier in the year, they had taxed each resident GHC1 for the repairs.

When I asked respondents where the money was being kept, they all told me the money was in the bank. I learned from interviewing the WATSAN committee, however, that it was not that straightforward. First, the treasurer said that the money is taken to the bank, and then she continued to say that the amount collected had not been sent to the bank after all:

> We take it to the bank. The initial amount we collected was too small—two people would have to take it to the bank—so we decided to wait until we had collected the levy for the next month. By

the time we'd collected enough the pipe broke down, so we used that money to repair it. So after we returned from the course [training], we started collecting money again. *(Woman, 40).*

An inspection of the bankbook however told a different story. It showed that no money had been deposited since the account was opened in February 2012: it only held the initial deposit of GHC20. Hence, there is no indication of where the money collected is being kept.

WATSAN executives touted the importance of accounting for money collected:

We ought to meet the community and let them know how much money we have collected, and how much we're going to take to the bank. So as we collect the money, they know where it's going. *Woman, 40*

The other WATSAN official (man, 35) also told me "We render accounts every 3 months and take the money to the bank.

However, one of them admitted there had been no account rendering for over a month: "We haven't done it since we got back from the training. We're still collecting money; they're not done paying. (*Woman, 40)*

The WATSAN officials seemed to understand the importance of transparency. They said in order to avoid suspicion the committee travels in a group when collecting levies, "so they know [one person] is not collecting without authorization":

There's quite a bit of money at stake, so the secretary has to be part of the collection team. Afterwards, we render accounts to the treasurer. (*Man, 35)*

C-6.3 Voluntary participation in community projects

According to respondents, information gathered from training workshop made the community realize the expense involved in replacing pump parts. This propelled the reintroduction of household water levies to ensure funds for future repairs.

Information from respondents indicated that the community has been diligent in repairing the facilities when they break down.

However, one of the pumps is located deep in the woods, and the path leading to it is overgrown with weeds. Hence its location makes it potentially unsafe for the people who fetch water from there. The picture below shows the path to the handpump in question.

Figure C4. The overgrown path leading to one of the community handpumps

Meetings are held sporadically, such as when a handpump breaks down. In addition, calls to clean the pump area are not promptly heeded. Although respondents said decisions concerning community issues are made in a participatory manner during meetings, it was also clear that there was limited engagement between the leaders and the wider community: “We meet on Tuesdays. The fact is, we don’t meet until the water is faulty. But if it breaks down, then we meet.” (*Man, 70)*

This seemed accurate, because the other respondents admitted the community had not had a meeting in several months (respondents' estimate was no meeting for about two to four months), although Tuesdays are designated meetings days.

One respondent believed residents have accepted the handpumps as their property because of what he's observed:

> What I've seen is the way we clean the pump area; that makes me see everyone considers it their property. When it breaks down, we don't wait too long before repairing it. We see it as a property. (*Man, 32)*

However the WATSAN officials reported that attitudes had changed considerably. According to them, neither the women responsible for cleaning, nor the wider community have exhibited much interest in the water facilities for some time. Hence the treasurer has been cleaning the two facilities on her own:

> As for the cleaning, residents normally do it. They'll beat the gong and announce that "today we'd be cleaning the pump area," and all the women would go to sweep around it. However, they have stopped doing so lately. They haven't sounded the gong like we asked them to since we came back [from the training], so now it's not being swept. I went over to sweep the place this morning. (*Woman, 40)*

She thought it was especially revealing that nobody had shown enthusiasm in learning about the outcome of the training workshop:

> Nobody has bothered to call a community meeting since we returned [from the training] so that we can inform them about what we learned; they've shown no interest in the pipe.

Respondents spoke of the community's ongoing support for the community school through participating in meetings and building a latrine: "Our elders meet with the teachers to discuss issues pertaining to the progress of the school. We also built a latrine for the school. (Man, 35)

C-6.4 Active role of women within the community

I found out during fieldwork that there are only two influential women in the community, the queen mother and the WATSAN treasurer (who also attended the training workshop). The queen mother has the traditional mandate to ensure women fulfill their customary obligations, while the WATSAN member has been put into a non-traditional leadership position normally reserved for men. Her status puts her at the helm of decision-making concerning the management of the water facilities.

I gathered from the interviews that the community observes traditional gender roles in assigning duties. Women are responsible for cleaning the community at least weekly, and the pump area daily, while men are required to clear overgrown bushes and push back sand that accumulates around the pumps after heavy rains. In fact, one respondent told me that "women can't do anything about [pushing back sand], so we men go and dig out the sand." (Man, 32*)*.

With the exception of the *Nketesia Hemma* (a title that translates as "young women's queen mother" but is herein referred to as queen mother), the entire village leadership is male. There are no women on the town committee, although the queen mother considers herself an elder in the community. There are two women serving on the WATSAN committee, one in an executive capacity and the other nonexecutive.

It is important to understand the role of the queen mother in order to fully grasp the gender relations in the community. She said the village elders appointed her for a specific task:

> My duty is to organize the young women in this village to do communal work. I also interact with the women, and give advice where necessary to make the women fulfill their responsibilities.

Another respondent mentioned: "The queen mother supervises the women to clean [the handpumps]." Thus her role is to ensure that the women in the community do not stray from their traditional duties.

The treasurer said part of her mandate is to accompany her colleagues to deposit the money in the bank, yet she has never performed this task as none of the money collected is being saved. She also keeps the bankbook. Even more significantly, her position as an executive member of the WATSAN committee makes it possible for her to directly influence policy concerning the water facilities. Hence her responsibilities are gender-neutral, while the queen mother's is gender-specific.

According to respondents, almost all the women have occupations and are financially independent, working as farmers; hairdressers; dressmakers; petty traders and food vendors.

C-6.5 Widespread understanding of the benefits of clean water

Respondents spoke about the eradication of guinea worm, cholera and bilharzia since potable water was introduced in the community. According to respondents, residents' initial reluctance to use the handpumps quickly faded once they came to appreciate its convenience and health benefits, and it remains the sole water source being utilized. They attributed the initial reluctance to the policy to charge for use of the facilities:

> I recall that when the water first came, some people didn't want to use it. They wanted to keep going to the stream. That was because we introduced a law that people should be charged for using, so that we will have money to pay for repairs. Some didn't understand that at all, so they would go all the way to Ochi to fetch water. Now it's changed. Most people do not go to Ochi to fetch water. (*Man, 70)*

He explained that, while the handpumps remain the main water supply, some residents living closer to Ochi occasionally fall back on it when the hand handpump breaks down:

The village has now expanded. I know about those who live down there, closer to Ochi. But when the pump breaks down, they do go to Ochi while waiting for the repairs. (*Man, 70)*

He however stressed that there is heightened awareness about the health risks of using water from Ochi:

One other thing is that some people came here to ask us not to be using Ochi frequently because there are diseases in it.... Diseases like blindness. They said if you drink it too often, you wouldn't live long before you start getting health problems. So that has put some fear into us. (*Man, 70)*

Another respondent confirmed residents' initial reluctance to Ochi, added that besides being new to the concept of paying for water, some also had trouble switching because they were more used to the taste of Ochi:

The thing is, when the pipe first came, people were not open to the idea of paying for it. All they knew was Ochi. Not many people understood the need for the pipe. They drank Ochi; they drank the pipe in addition, since that had become closer. As time passed, everyone understood that we need to drink the pipe, so they stopped going to Ochi—so all we drink is the pipe. (*Man, 32)*

Other respondents echoed the awareness about the health benefits of using the handpumps instead of Ochi:

What I've noticed is that back when we drank Ochi, people used to get all sorts of diseases... like guinea worm, cholera and others used to infect people. But since they stopped [drinking Ochi] and focused on the pipe, we don't hear about those diseases anymore. (*Man, 32)*

> The pipe helps our health when we drink it; it saves us from several diseases.... Like guinea worm; and sometimes when children drank the Ochi they would have pain while urinating [bilharzia]. But since the pipe came, all those things are gone. (*Woman, 47*)

Residents also believe that the two water facilities are capable of providing long-term water supply for the community: "As for the water, there's a lot in it; there's a lot of water in it to last us a long time." (Woman, 47)

C-6.6 Other indicators

The two training participants spoke of increased awareness about the need to save for future repairs as a result of knowledge acquired during the training workshop. However, the community's delay in assembling to hear feedback from the training participants indicates less enthusiasm than expected from residents.

C-6.7 Summary

Evidence points to a less-than satisfactory level of performance in Etsii Abeka. Although household water fees have been set, there is no effective mechanism for ensuring compliance. The absence of sanctions, in essence, makes the payment voluntary rather than obligatory. Indeed, some residents have systematically refused to pay and the WATSAN officials have been unable to retrieve the outstanding debts.

Another issue of concern is the lack of accountability and financial transparency. Certainly, claims to regular accountability sessions where residents are informed about the amount of money deposited in the bank are doubtful, considering that the bankbook shows no such deposits have been made.

Residents appear convinced that the handpumps are healthier than the stream, and definitely more convenient than going to Ochi. Yet this acknowledgement does not fully reflect their attitude toward maintaining it. It is particularly revealing that residents have shown no enthusiasm to hear the outcome of a workshop that is designed to train local people to perform preliminary repairs on the water facilities.

While it is laudable to have two women leaders in the community, it is still a scant number among a population of over 400. More women in leadership could mean greater attention to issues that affect women. It could, for instance, enhance awareness in enforcing water use regulations, and even introduce new rules that would improve the management of the water facilities.

Table C-6. Summary of findings in Etsii Abeka

Variable	Findings in Etsii Abeka
1. Demonstrated ability to manage local projects	Etsii Abeka has two handpumps. According to respondents, earlier efforts to sell water by the bucket failed, but water levies have now been introduced. However, there was no indication of clearly defined, equitable and well-enforced rules governing local projects. For example, women were supposed to clean the pump area, but this was not enforced and there were no penalties for refusal to clean. Similarly, the community has no protocol for handling defaulters besides applying constant pressure and summoning them to the chief/regent for questioning. The community has a WATSAN committee that oversees the two water facilities. They report all faults to the town committee, who subsequently inform the regent and the elders. The community appears to have a well-established leadership team consisting of the town council on one hand, and the regent and elders on the other, and WATSAN committee on the other. However, there was little evidence of coordination among the leaders. WATSAN officials expressed frustration at the leaders' delay in calling a meeting to receive feedback from the training workshop. The pump caretakers regularly monitor the handpumps, tightening lose bolts and watching for first signs of a fault. The treasurer had also taken to cleaning the facilities since the other women have failed to do so. Neither pumps looked particularly clean on inspection: The handpumps and parts of the surrounding areas were muddy, weedy and strewn with litter.
2. Financial management of local projects	Household water levies are being collected. Records showed the last levies were collected on October 15, 2013 (a month before these interviews were conducted). Although respondents said the money was being taken to the bank, the bankbook showed no money has been deposited since the account was opened in February 2012: it only held the initial deposit of GHC20. Hence, there is no indication of where the money collected is being kept. Executives spoke about periodically rendering account to the community. While no one could recall the last time this was done, they admitted it had been over a month.
3. Voluntary participation in community projects	Respondents spoke of the community's ongoing support for the community school. Information from respondents indicated that the community has been diligent in repairing the facilities when they break down. However, one of the pumps is located deep in the woods, and the path leading to it is overgrown with weeds. Hence its location makes it potentially unsafe for the people who fetch water from there. Meetings are held sporadically, such as when a handpump breaks down. In addition, calls to clean the pump area are not promptly heeded. Although respondents said decisions concerning community issues are made in a participatory manner during meetings, the evidence point to limited engagement between the leaders and the wider community. Certainly, claims to regular accountability sessions where residents are informed about the amount of money deposited in the bank are doubtful, considering that the bankbook shows no such deposits have been made.

Table C-6. Summary of findings in Etsii Abeka (continued)

Variable	Findings in Etsii Abeka
4. Role of women within community	Adherence to traditional gender roles means that men make major decisions in the community, and it is clear that more women need be admitted into the leadership team. However, the queen mother and the female WATSAN official appear to have gained a foothold into the leadership circle of the community. Nonetheless, the queen mother's mandate appears constrained, because her duties entail maintaining the status quo. On the other hand, the treasurer keeps the bankbook. She also accompanies her colleagues to collect household water levies. In addition, women have a measure of financial independence in that majority engage in income-generating activities. Traditional gender roles are observed in assigning duties: Women are responsible for cleaning the community at least weekly, and the pump area daily. Men are only required to clear overgrown bushes. Also, there are no women on the town committee, although the queen mother considers herself an elder in the community. There are two women serving on the WATSAN committee, one in an executive capacity and the other nonexecutive. Investigations revealed that there are only two influential women in the community, the queen mother and the WATSAN treasurer (who also attended the training workshop). The queen mother has the traditional mandate to ensure women fulfill their customary obligations, while the WATSAN member has been put into a non-traditional leadership position normally reserved for men. Her status puts her at the helm of decision-making concerning the management of the water facilities. According to respondents, almost all the women have occupations.
5. Widespread understanding of the benefits of a water facility	Residents appreciate the convenience and health benefits of the water facilities, and are assured of its capacity to meet their water needs for the long term. Respondents spoke about the eradication of guinea worm, cholera and bilharzia since potable water was introduced in the community. According to respondents, residents' initial reluctance to use the handpumps quickly faded once they came to appreciate its convenience and health benefits, and it remains the sole water source being utilized.
6. Other indicators	Without the wider community's understanding of the lessons learned at the workshop, the WATSAN members have little opportunity of pursuing policies that would promote success management of the water facilities. The two training participants spoke of increased awareness about the need to save for future repairs as a result of knowledge acquired during the training workshop. However, the community's delay in assembling to hear feedback from the training participants indicates less enthusiasm than expected from residents.

C-7 Eyiakrom

According to the chief of Eyiakrom, the village was established around A.D 1200/1300. It was founded by members of the Enyan group of Fantes who had migrated from Techiman (in present-day Brong Ahafo Region) to Mankessim near the coast in the Central Region (a distance of about 250 km). The people of present-day Eyiakrom were part of a subgroup that initially settled in Mankessim and then

dispersed further inland to establish farming communities. Eyiakrom is about 12 km north of Mankessim. This account corresponds with historic descriptions of the origins of the various Fante people (see Boahen, 2004). The village was named after an elder named Eyia, who led that group.

At the time of the 2010 census, the village population, was 331. Residents are mostly farmers, though some are also engaged in dressmaking, hairdressing, carpentry, masonry, and petty trading to supplement their income.

My respondents in Eyiakrom included three men (the chief, a village elder and the WATSAN secretary) and two women (WATSAN chair and pump caretaker). Both women were also trained pumped technicians, having attended the training workshop in October 2013.

C-7.1 Demonstrated ability to manage local projects

Eyiakrom demonstrated competence in managing two of the three projects being implemented in the community. Besides the water project (which led to the installation of the water facility), the community has ongoing health and sanitation projects that had been running for 10 years at the time of the study. In addition, residents had contributed financially and in-kind to the establishment of a community elementary school. The village also has a longstanding environmental program that requires joint cleaning of the community on a weekly basis.

C-7.1a) Clearly defined, equitable and well-enforced rules governing local projects

Eyiakrom has clearly defined rules governing all its projects. As part of the environmental project, residents are expected to participate in weekly communal cleaning exercises. The health project requires residents to construct individual household latrines, which the chief explained was an exercise in progress. Community members are also required to fully participate in other ventures such as supporting the establishment of the village school.

However, plans to establish a payment system for the water supply never materialized because the well produced little water so the residents did not receive the expected benefit of a reliable water supply:

> When the water first came, we had a community meeting. Some suggested selling it, others said to collect monthly household levies. But because of the way the water situation turned out, neither selling nor collecting levies worked. (*Woman, 66)*

C-7.1b) Effective conflict resolution mechanisms

According to respondents, the procedure for handling conflicts, such as refusal to observe established rules, is to report the culprit to the chief.

C-7.1c) Monitoring

Members of the management committees of the respective projects have direct responsibility for monitoring them. However, there are occasions when all officials work together to handle issues:

> We work together at some point; other times we do things separately. When it comes to addressing water issues, it's the responsibility of the WATSAN committee, and when it comes to environmental cleanliness for the entire community, the sanitation team takes over. (*Man, 56)*

As in all the study communities, the WATSAN committee is responsible for monitoring the performance of the water facility. That is in addition to the external monitoring by the NF/REDEP/AMEFS team.

Considering the water problems described by respondents, I enquired whether the performance of the water facility had affected the functioning of the WATSAN committee. One respondent explained that it had reduced the frequency of WATSAN committee meetings:

We used to meet frequently in the past, but ever since the problem started and the water situation became this way, we haven't met for about 6 months. But at first, during the time we were working on getting the water, we used to meet regularly—we learned about how to take care of it and so on, but because the water isn't working. (*Man, 46)*

C-7.1d) Functionality, maintenance and cleanliness of the water facility

The water facility in Eyiakrom was not functional at the time of the study because the well recharges at a slow rate. It produced only about 18 liters of water at a time and required three to four hours to recharge. Residents are aware of the problem and seemed to understand that it is due to the nature of the bedrock in the area. For example, the 56-year-old WATSAN pump caretaker explained that the poor yield was due to the fact that "The rocks here are embedded deep in the ground. They said when they dug the one up here, they hit only rocks, no sand."

Other respondents shared their views about the water problem:

The problem we have with the water is that when you fetch just about a bucket [18 liters], it stops running. So you can't go there and expect o get 3 or 4 buckets; you'll have to wait some hours—1 or 2 hours—before you can get any more water. *(Man, 46)*

I myself have seen the nature of the aquifer, and so I understand that there's just not enough yield. I could see that the water was coming from just between the rocks, so it's all surface water. There's no water down there. That explains why it cuts off within a short time. (*Man, 76)*

In spite of this problem, the pump area was clean on inspection, and was being maintained by the two women pump technicians.

Respondents indicated that the situation with the water facility had not changed since it was last repaired in 2012. That work involved lengthening the pipes in the borehole in the hopes that it would

increase the water output. The chief was especially impressed with the technical support provided by the program implementers:

> We haven't had a problem since the last repairs were done [in 2012]. We have a foundation in Abaasa; they go round to other villages to help repair the pumps. They're called Nyarkoa Foundation; they recently trained women in this village to repair the pumps; they've shown the tools to us. They've been really helpful. (*Man, 76)*

C-7.1e) Role of leadership in water project

I learned that the village leadership played an active role in managing the water facility. As the elder explained, all issues concerning the water facility are reported to the chief and elders, who then deliberate in search for a solution. He explained that the leaders had assessed the problem of low water yield and sought technical assistance of NF/REDEP. However, the problem persists in spite of repeated efforts:

> We support the WATSAN committee; if any issues come up with the water [handpump], they inform *Nana* and his elders. From time to time to go over there to inspect the performance—and truly, it cuts off after 1-2 buckets. So we have an elder in Abaasa [REDEP's executive director]—they have worked a lot on this, about 3, 4 times. At one point, they came in to change the pipes in hopes that it would improve the situation, but it's still the same. (*Man, 53)*

C-7.2 Financial management of local projects

According to respondents, planning to establish a financial policy for the water facility ended when residents became disillusioned because of the poor water supply. The chief elaborated:

> When it was first installed, I recognized it was expensive and suggested that we sell it—at a price that everyone could afford—so we can have money to repair it when it breaks down. The problem

is that, unlike Nkodwo, the water doesn't run as smooth—it dries up constantly. Because of that, residents are not too pleased with it. (*Man, 76*)

Other respondents reiterated that the low water yield had derailed all plans to save money for the inevitable repair work:

We were prepared to pay for it when first came, but since it didn't work. They would have paid, because we wouldn't have sold it too expensive. Among 50 pesewas or 1 cedi, 2 cedis. If each household fetched about 5 times each day, we could save that. (*Woman, 66)*

As a result, the community has no money saved in the water fund:

With the water—we decided to collect money—and the entire community agreed. But because it didn't run, we couldn't enforce it. So we have an account there—we have an account for the water, with bankbook and everything.... We haven't deposited any money since we opened the account. (*Man, 56)*

While recognizing the frustrations of a low output water system, respondents generally felt it was unfortunate that their fellow residents had written off the handpump. For example, the WATSAN chair believed that if those residents who did fetch whatever water the well produced paid for the water, it would be a good start toward building a water fund:

Even though the water isn't running continuously, if they paid 50 pesewas a day for what they fetch, it would amount to something. I have made several announcements myself, but they pay no attention to me. They get up at dawn to fetch it. *(Woman, 56)*

According to the pump technicians, they had tried unsuccessfully since their return from the training to renew residents' interest in saving for the water facility since. Even those who continue to fetch the little water it generates refuse to pay. The WATSAN chair elaborated:

> After we returned [from the training workshop] we announced that when we attended the workshop we learned that the parts were expensive, so we had to start saving money. We told them that even though the water wasn't running well, we could save some money if residents paid for whatever they fetch – even if it meant charging 50 pesewas or 1 cedi per bucket –we could save little by little, we'll have money to repair the pump when it breaks down. So we informed them, that whatever amount of water the well generated, they would have to pay for it when they fetch. But because I haven't locked it yet, some sneak by and fetch it; others do pay for it. Whoever I do see pays for it. (*Woman, 56)*

However, she admitted that she had not been recording the amounts paid by those people that she is able to collect money from:

> At first when we planned to sell, we had books all set up to record payments, but now they're not actively fetching it. Besides, I'm not always around when they fetch. It's just about 2 cedis, so I didn't start recording.

The chief also expressed exasperation at the failure to collect money for savings, recognizing that it the lack of savings reduced the community's chances of finding solutions to their water problem:

> We've done everything possible, but they're not in agreement. The thing is, sometimes residents in this community prove too difficult. I realized it would be helpful to pay occasional levies so the community has some money put aside as capital…For example, this pump has been changed twice; the first one didn't work, the second didn't either—although it did for a while. I monitored

it myself; they'd only fetch two 18 liter buckets and a couple other small one, and then it would stop running.

I felt that wasn't so bad if we could get that amount of water every 4 hours. But people have simply lost enthusiasm because it keeps cutting off. We've done all possible; even family levies would bring some income, but none of that worked because of misunderstanding. Some said they'd never fetched the water; another gave some other excuse. Currently, I've noticed that the foundation is shrinking and needs to be repaired. After repairing it, the only alternative is to lock it. Once it's locked, whoever fetches will have to pay.

C-7.3 Voluntary participation in community projects

According to respondents, residents are generally supportive of community efforts. For example, the chief recounted the widespread support that residents gave to the building of the elementary school, as well as efforts to improve the village road:

What I can say is our road and our school—we do very well with those. Because the road is not tarred, any time it gets rough the community has to repair it; we don't joke with that…With the school, we started the primary, before the government built a permanent block. We built a bamboo structure, the government built a cement structure, and then later two NGOs came in to support. We had requested a middle school in addition to the nursery and primary that we had.

He recalled the dedication with which residents addressed the school building project:

They built the school nicely….residents used it for communal work—men and women. They said every Tuesday—but they were very serious—they'd beat the gong even Fridays, and everyone would go—Friday and Tuesday… It's like someone is bringing you a gift, and is asking that you

help with it. Because we like it, we all helped to make it work... I will say that as long as we agree to do something, everyone gets involved—I can say that at least 90% support our ventures.

This level of dedication, however, did not transfer to the water facility. One respondent summed up residents' attitude toward the hand pump: "Because the water didn't run as expected, they're no longer interested in the water [hand pump]. So, those of us in charge are the ones protecting it." *(Woman, 56)*

Asked why residents have not shown the same level of support for the water project as they did for the school, one respondent explained: "They can see children going to school in the building that they helped put up, but they're not seeing any results with the water." (Woman, 66)

Community meetings are held when there are pressing issues to be discussed. Meetings are held on off-farm days, and residents are informed ahead of time. Nonetheless, the chief admitted that full attendance is not always guaranteed, because the timing is not always convenient for every resident. He did concede that attendance is usually higher when residents are notified three to four days in advance:

> [We hold meetings] when something happens that we need to inform residents about.
>
> Also, we have various committees here; whenever they return from a program [outside the community], we call a meeting so they brief the community of what happened.
>
> We meet at any time; Tuesdays are off-farm days, so if we want to meet residents, we schedule it for Tuesdays. We also schedule communal labor for Tuesdays. If we have a really pending project, we schedule communal work on Tuesday and Friday. When that time comes, we notify residents and they respond.
>
> However, we haven't established specific meeting schedules. We only call meetings when it's absolutely necessary. In the interim, opinion leaders monitor all ongoing projects and give me the information. As you know, when it comes to meetings, it's not possible to get everyone present. However, if the message goes out 3,4 days ahead of time, definitely we'll have a big turnout.

C-7.4 Active role of women within the community

The WATSAN committee is currently made up of 4 people: one man and 3 women who are the pump technicians. In addition, a number of women serve as executives on the other community projects. While the active role of women in community projects is recognized, they are not perceived as community leaders. This is because leadership is traditionally considered to be a man's role. The chief explained that the positions of project leads would have automatically gone to men rather than women, if there had been enough men to fulfill those roles. Due to male rural-urban migration, women in the community have been given traditionally male leadership roles, but women are still not considered to be opinion leaders.

> Chief: What happened was, because there are no jobs here, at some stage the young men tend to leave, and this is the situation we're in now. Ideally, we should have 10 members monitoring every project. We're now fallen to just a few. We've appointed some of them to join the opinion leaders in coordinating the projects. So these are the people we govern with.
>
> Interviewer: When you say opinion leaders, are you taking about men?
>
> Chief: Yes, it's men. We've appointed women to committees like WATSAN and the health team. As for those in charge [of those committees/teams], it's men.

Having said that, he went ahead to praise the dedication with which the women performed roles assigned them:

> As for the women—now when we say it the men tend to get annoyed with us—right now we praise them more.

> The fact is that right now, we praise the women more than the men. Take for example the KVIP [latrine] under construction; it's the women who fetch water everyday. The men also fetch, but the women are more consistent. We can see they're doing their best.
>
> Anytime you call on them, they'll respond. Today for instance, they've cleaned up the opening to the church, because the Catholics are going to have Corpus Christi. That's the women's job….The men also make sure the areas surrounding the latrine and the hand pump are clean; they clear the weeds.

The chief's description of the dedication with which women perform their assigned roles in the community was corroborated by the pronouncements of one of the pump technicians. During the interview, one of them stated strongly that she felt mandated to do all in her power to ensure the successful management of the water facility, even though it had been a tough job:

> I have to do it—because I live close to it. I've talked too much. Someone removed the chain that I used to lock it and took it away. If you put a lock on it, they break it. By the time I return from the farm, they'd have broken the key and thrown it away—and fetched the water. So it's making me talk too much. *(Woman, 56)*

C-7.5 Widespread understanding of the benefits of clean water facility

Findings showed that residents in Eyiakrom had a clear understanding of the health benefits of clean water, because health and hygiene education is a key component of the NF/REDEP water program. Residents were further aware that clean water protected them from contracting water-borne diseases like guinea worm, which was endemic in the area prior to the drilling of wells in other communities in the area. In fact, the chief explained that it was the reason why the community requested the water facility from the government:

> There was a time when guinea worm was rampant here—almost everybody got infected. So we went to Council [local government] for them to come treat the water, before it went away.
>
> Due to education, everyone understands that the water is raw [unsafe, polluted], and that if you drink it and get infected you'll have yourself to blame.

He added that even though some residents fetch water from the spring (which is not safe) for other purposes, they purchase purified (sachet) water for drinking:

> Because of the proliferation of sachet water, people can buy that and use. They do buy the sachet water, especially the teachers here. Whenever the cars come, they call out to people to come and buy.
>
> Purposely for drinking, I know that by now—almost everybody [buys sachet water]. When I see the rate at which they buy sachet water, it's clear that everyone has the desire for good drinking water. *(Man, 76)*

Another indication that some residents do understand the health importance of clean water is that they are willing to go to the neighboring village (Nkodwo) to buy water.

> They don't pay for the well, but once they go to Nkodwo they need to pay, because there are cash collectors at both water points. I doubt that many people go there as long as the borehole has water—they prefer the cheap one.

Some respondents indicated that the location of the water facility might be a contributing factor to residents' lack of commitment to its maintenance. For instance, its location is somewhat inconvenient for residents who live further away:

That place is also hilly. Imagine having to trek that hill with no assurance that they'd get any water. If they just walk up the road, they can easily fetch from the well! That's the whole problem. *(Man, 76)*

However, respondents were also quick to point out that distance would not be a hindrance if the well yielded enough water:

Those who live in the center of town complain the water [handpump] is located too far away. If it produced water, we'd go to fetch it even if it were far. *(Woman, 66)*

Another respondent said because the handpump is located so "close to the spring, some would rather fetch from the spring than pay for water." (Woman, 56)

The water is located right next to our stream. So, when some people get there and realized we're charging for the pipe, they just go ahead and fetch from the stream. *(Woman, 56)*

The chief believed that the relative abundance of surface water appears to be another factor for residents' lack of interest in investing in their low yielding handpump. In addition to the spring, there are puddles and two open wells that fill with water during the rainy season, but he recognized that those were not ideal sources of water:

The water is almost available everywhere [else]—it's not sufficient for us really, but it's almost everywhere. For instance, we share the pump in Nkodwo—our residents fetch it all the time. Because of that, they won't waste their time to come here—that's how I see it.

We have stagnant waters and open wells; they can just go and get some. Because of that, they feel this one is not so necessary to them. So it's up to us opinion leaders and the WATSAN members. We're trying to get it working again so it becomes useful—that's our problem.

When you talk of potable water, we're in need. The kind of water [open well] we have here is not safe. Even if you tell them to boil or strain it before drinking, they won't have time to do that—they feel water is water.

For that matter, we don't think what we have now is good for us. We want good drinking water for all purposes. Being a village, we could even use some for palm oil processing and household chores.

Asked whether residents really understood the health benefits of clean water, one respondent replied: "They do understand, and would be happy with it if it worked." (Woman, 56)

C-7.6 Other indicators

One key observation in Eyiakrom was the chief's perseverance in the face of the constant challenges posed by a low-producing well and the intransigence of residence who saw no need to continue managing the water facility.

C-7.7 Summary

As the results indicate, Eyiakrom is a community with the potential for having a successful water projects. Their competent management of other community projects attests to this, and its history of active community involvement and strong women's participation in community efforts makes it a likely candidate for sustainable water supply. However, this potential is stifled by the infrastructural problem of low-yielding borehole.

Table C-7 summarizes findings in Eyiakrom.

Table C-7. Summary of findings in Eyiakrom

Variable	Findings in Eyiakrom
1. Demonstrated ability to manage local projects	Eyiakrom currently has three projects: water, sanitation and health. Each project has a management team comprising members of the community. The water and sanitation projects are governed by set rules. The sanitation project requires residents to maintain good environmental hygiene through cleaning and establishing designated garbage disposal posts, and to build community and household latrines. The community latrines have been constructed, household latrines are in various stages of completion, and residents hold weekly communal cleaning exercises. The community also has a designated refuse dump. The rules governing the water project include closure and charging water fee per bucket fetched (water point collection). According to respondents, several attempts to lock the handpump have been unsuccessful as the lock gets broken every time, leaving it open for people to fetch without paying for it. The health team consists of local volunteers who work with public health nurses to monitor geriatric, child and maternal healthcare. Besides the three projects, the community has also assisted in building two classroom blocks, and remains actively involved in the community school. There is clear evidence of effective management of two out of the 3 ongoing community projects. All five respondents admitted that residents have been cooperative in following the directives of the health and sanitation team, but have systematically ignored that of the water committee.
2. Financial management of local projects	Since 2003, the community has sustained a healthcare program with an NGO called "Hope for Future Leaders." As part of the program, one member of the health team stores first-aid supplies for the community. According to respondents, the first supplies were donated by the NGO, but subsequent restocking has been financed with proceeds from the sale of the first batch. Meanwhile, residents have refused to make any investment in the handpump because of the low yield. Although some people do fetch whatever little the handpump produces, the general view is that it is a waste to spend money on it. Occasionally, money is collected from residents who are observed fetching water, yet the record for these payments could not be verified. Respondents admitted that no money has been saved in the bank account since it was opened, and the bankbook was not available for inspection.
3. Voluntary participation in community projects	Respondents conceded that residents are usually cooperative with projects from which they see clear benefits, such as building a school block, participating in communal cleaning exercises, and volunteering for health and sanitation projects. Some members of the community are actively engaged with three NGOs that work to promote environmental health, child welfare, and healthcare. Evidence shows that residents are only supportive of projects they perceive as useful in the short-term but they do not see any potential solutions to the problem with their water facility.
4. Active role of women within community	A woman, who was one of two women trained as pump caretakers, chairs the WATSAN committee. These two women are the only active WATSAN members. A number of women are also serving as volunteers in the other community projects. One respondent acknowledged the remarkable contribution of women to community projects, but did not recognize them as "opinion leaders." Although women are not officially considered leaders, the two WATSAN women in Eyiakrom have exhibited clear leadership in their handling of the water situation. It is through their diligence and collaboration with the chief that the water facility still stands, despite neglect from the rest of the community.
5. Widespread understanding of the benefits of clean water	Respondents recognize the importance of clean water, but the low yield has dimmed interest in maintaining the water facility. Current water supply for residents come from seasonal rains, an open well and a stream within the village, and a handpump in a neighboring village. Some also purchase bagged purified water for drinking. Awareness that water from open wells and streams harbor diseases has not stopped residents from accessing these sources when convenient.
Other indicators	Strong, committed leadership that does not give up in the face of several disappointment with the water facility.

C-8 Ogoekrom

Ogoekrom is a farming community with a population of 185, set in a deep forest. According to a village elder, it was founded in the pre-colonial era by farmers from a village called Ogoekrom, near Anomabu (in the neighboring Mfantsiman District). They named it *Ogoekrom Kakraaba* (little Ogoekrom) and eventually bought the land and established the community.

In addition to farming, some residents are also hairdressers and food vendors, selling foods like *kenkey* (maize meal) and pastries. There is no community school in Ogoekrom so children walk about 1km to attend school at Etsii Abeka.

My respondents in Ogoekrom included three women (the village treasurer and two trainee pump technicians) and two men (the WATSAN secretary, and an elder who is also the WATSAN chair).

C-8.1 Demonstrated ability to manage local projects

The water facility was the only project in the community. Although Ogoekrom had established rules concerning its use, they were not being universally observed at the time of the interviews.

C-8.1a) Clearly defined, equitable and well-enforced rules governing local projects

Ogoekrom has one handpump and a WATSAN committee that is actively involved in managing the facility. The agreed rules covering the use of the water facility include fixed water levies for women, and group contributions from the men who work as farm hands. In addition, women are expected to take turns cleaning the surroundings, while men have the duty of clearing thick brush. In addition, children below the age of 10 are barred from operating the handpump.

At the time of the interviews, respondents admitted that the rules were not being strictly followed. According to them, children younger than 10 were routinely seen operating the handpump, some women did not always clean the pump area at their designated time, and financial contributions were non-existent.

However, there was evidence that the rules were widely known and understood even by young people. For instance, one respondent recalled that when she asked her eight-year-old daughter to fetch water from the pump, she reminded her that it was against the law and refused to go:

> The other day I was asking my daughter—she's eight years old—to go fetch me some water. She told me the law says she can't fetch water unless she turns 10, and that I'd be fined 2 cedis [GHC2] if she goes, so she didn't go—and I didn't insist. I realized if every child did that, it would be a long time before the pump broke down. But all children are not the same. If every child did that, we would be better off. *(Woman, 29)*

C-8.1b) Effective conflict resolution mechanisms

Respondents told me that the community has set procedures for addressing conflicts arising from the enforcement of water use rules. For example, men and women who fail to honor their financial commitments are supposed to be fined:

> With us men, if you refuse to participate in the hired labor, you'll be fined. If you don't cooperate, we'll let the law take its course. It's the same with the women; if anyone refuses to pay, we'll let the law take its course, because we all benefit from the water. *(Man, 48)*

Parents who allow their under-aged children to operate the facility are also subject to a fine:

> We've decided that any parent who allows a child younger than 10 to operate the handpump—or any child caught wasting the water—some just pump it away without a container to catch water, they just play with it. If we catch any child like that, the parents will be fined 2 cedis (GHC2) *(Woman, 29)*

One respondent also said the community was planning to put a lock on the handpump to discourage its use by under-age children, and to ensure that people honored their financial contributions.

C-8.1c) Monitoring

As in other study communities, the WATSAN committee (and specifically the pump technicians) monitors the handpump daily to ensure it is working correctly. This entails tightening lose bolts and detecting mechanical problems.

C-8.1d) Functionality, maintenance and cleanliness of the water facility

The handpump in Ogoekrom was fully operational at the time of the interviews, and the surroundings were clean.

C-8.1e) Role of leadership in water project

The leadership of Ogoekrom is actively involved in the management of the water facility. As mentioned, the WATSAN chair is also one of the village elders. This is significant because it ensures that issues concerning the handpump receive the full attention of village leaders.

C-8.2 Financial management of local projects

As mentioned, Ogoekrom's financial policy entailed a fixed levy for women and group contributions from men through wages earned from work in the fields. According to one respondent, this strategy was chosen over the pay-by-the-bucket alternative because it seemed the most practical means of raising funds for future repairs:

> When we met, we discussed that even if we wanted to sell it, we wouldn't have someone to sell it, because we'll have to pay whoever sells it, and we don't have that money. So we men go out to weed every week, and the women pay one cedi every month. We take that money to the bank. *(Man, 48)*

I also learned that the elderly and the impoverished were exempt from the payments, and that the payments were introduced in 2010:

> The initial consideration was to sell the water, but to exempt really old people and those who genuinely can't afford to pay. But that wasn't practical, so we established the levy and group fundraising instead; that was in 2010 *(Man, 30)*

This system worked for a while, but at the time of conducting interviews in October 2013, residents were no longer contributing as expected. The treasurer, however, had a list of all paid as well as defaulting residents, and informed me the outstanding amounts would be collected in due course.

The WATSAN members who were interviewed indicated that efforts were underway to encourage greater financial commitment. Among other measures, they were considering locking the pump to prevent chronic defaulters from accessing it. In fact, by May 2015, the handpump was locked and the community was saving the proceeds from the sale of water in a bank account.

C-8.3 Voluntary participation in community projects

Respondents said residents are generally responsive to calls to participate in community efforts. Meetings are called as needed, with ample notice to ensure wider participation. According to residents, decisions such as water use regulations are taken after deliberations during meetings. The failure to adhere to the established financial policy at the time of the interviews in 2013 raised questions about residents' commitment to the success of the water facility. However, as noted above, that attitude had changed by 2015.

C-8.4 Active role of women within the community

Women constitute three out of seven Town committee members, and two out of seven WATSAN members in Ogoekrom. Although women formed the minority of the two committees (WATSAN and Town) in Ogoekrom, their presence was actively felt. I noticed that the knowledge gained through the training program emboldened them to take more active roles in managing the water facility. For example, the two pump technicians raised awareness about the need to prepare for future maintenance, prompting

residents to eventually adopt measures aimed at managing the facility more responsibly. In fact, one of the pump technicians not only coordinated the cleaning, but also took the initiative of mobilizing residents to place rocks around the pump platform to stop erosion:

> What I do is, I check to see that children do not play around the pump areas. I call them to help me gather stones around the pump platform, because it's eroding and gets soggy when it rains *(Woman, 40)*

She said she got the idea to gather stones around the platform from the engineer who did the training:

> We learned from Mr. Ansah that stones could help reduce the rate of erosion. So when we came back, I called a meeting, and called all the women to help gather the stones, because we have that problem here *(Woman, 40)*

Even though she was not originally part of the WATSAN committee, she had become the pump cleaning coordinator:

> I take a pan and beat it every week to call all the women, so we can plan when to clean the pump and its surroundings. We clean and weed it every week. *(Woman, 40)*

When I asked her whether she had been appointed to beat the *gong* she said no, she initiated it on her own. She said she always informed the chief about her activities:

> Nobody asked me to beat the *gong* and call the meeting, but those were the things that I learned at the training. I was one of two women who represented this community at the training, so I see myself as having the responsibility to put what I learned into practice.
>
> Before I do that, I inform Nana [chief] that I want to gather the women to perform a certain task, and he gives me the go-ahead. *(Woman, 40)*

The level of enthusiasm shown by the women led the elder and committee chair to express unreserved confidence in their ability to repair the handpump in the event of breakdown:

> As I said, just about three months ago they took two women from here and trained them on how to repair the pipe when it breaks down—so we wouldn't need to bring someone in who would charge us a big amount. They can service it. *(Man, 48)*

C-8.5 Widespread understanding of the benefits of clean water

Like those in other study communities, residents in Ogoekrom understand the health benefits of clean water at least partly due to the health education included in the NF/REDEP program. My respondents told me that residents deem the handpump quite important, because it is the only clean water source in the area. The only other water sources are a shallow, open well which, although relatively close to the community, is considered unsafe for drinking, and a stream that is further from the village, and equally unsafe. They particularly remembered that the installation of the handpump in 1984 led to the eradication of guinea worm in the village:

> At first when this water wasn't here we had guinea worm infections. During the farming season, you'd find many here who were sick and bedridden—that's the truth. But since this water came, all that has changed. *(Man, 48)*

C-8.6 Summary

In general, Ogoekrom is a cohesive community that recognized the importance of maintaining the handpump as it offered the only safe, reliable and convenient water source. These attributes, combined with the presence of active women who are relentless in their efforts to promote more effective water management, increases the prospects for sustainability of the water facility. Table C-8 is a summary of findings in Ogoekrom.

Table C-8. Summary of findings in Ogoekrom

Variable	Findings in Ogoekrom
1. Demonstrated ability to manage local projects	Ogoekrom has one handpump and a functional WATSAN committee. The community has instituted monthly water levies for women while men are expected to bring in contributions from paid labor. This system worked for a while but seemed to have collapsed over the past few months.
2. Financial management of local projects	The community has instituted monthly water levies for women while men are expected to bring in contributions from paid labor. This system worked for a while but seemed to have collapsed over the past few months. According to respondents, neither men nor women have honored their financial commitments for the past six months. It is worth noting that the woman in charge of collecting women's contribution has a list of defaulters and corresponding areas. Plans are however underway to introduce monthly household levies. Once adopted, the handpump will be kept under lock and defaulters prevented from accessing it.
3. Voluntary participation in community projects	Respondents indicated that the community is committed to maintaining its water facility, and are responsive to directives to that effect. However, failure to adhere to the established payment policy tells a different story.
4. Role of women within community	The women who participated in the pump training workshop have taken up the task of coordinating the cleaning of the pump area. One of them even mobilized residents to spread stones around the pump area to prevent sogginess. This is impressive considering that she was not a member of the initial WATSAN committee. Respondents expressed confidence in the ability of the trainees to repair the pump when the need arises. Although the trainees may not be able to perform anything more than minor maintenance, this reflects a shift in traditional attitudes toward women. These two women are also at the forefront of efforts aimed at enforcing established water use regulations and brainstorming ways to enhance maintenance of the water facility.
5. Widespread understanding of the benefits of clean water	According to the leadership, the community considers the handpump important because the only alternative water sources are a stream that is too far away and shallow well, both of which are deemed unsafe for consumption. Residents further recalled that the introduction of the handpump led to the eradication of the guinea worm endemic in the village.

Appendix D: Institutional Review Board Research Approval Letter

UNIVERSITY OF ALASKA FAIRBANKS

(907) 474-7800
(907) 474-5444 fax
fyirb@uaf.edu
www.uaf.edu/irb

Institutional Review Board
909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

July 9, 2012

To:	Susan Todd, PhD Principal Investigator
From:	University of Alaska Fairbanks IRB
Re:	[333717-2] What Determines Governance Patterns in Rural Water Programs, and How Does this Impact Sustainability? A Comparative Study of Community Water Projects in the Ajumako-Enyan-Essiam District, Ghana

Thank you for submitting the New Project referenced below. The submission was handled by Exempt Review. The Office of Research Integrity has determined that the proposed research qualifies for exemption from the requirements of 45 CFR 46. This exemption does not waive the researchers' responsibility to adhere to basic ethical principles for the responsible conduct of research and discipline specific professional standards.

Title:	What Determines Governance Patterns in Rural Water Programs, and How Does this Impact Sustainability? A Comparative Study of Community Water Projects in the Ajumako-Enyan-Essiam District, Ghana
Received:	May 11, 2012
Exemption Category:	2
Effective Date:	July 9, 2012

This action is included on the July 12, 2012 IRB Agenda.

Prior to making substantive changes to the scope of research, research tools, or personnel involved on the project, please contact the Office of Research Integrity to determine whether or not additional review is required. Additional review is not required for small editorial changes to improve the clarity or readability of the research tools or other documents.